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ABSTRACT

During 1987-88, the Center for Advanced Study in Education, continuing its program to promote quality mathematics instruction in the nonpublic, religiously oriented schools of New York City, focused on teachers who teach mathematics in grades four through six. The three objectives of this project were to increase the number and diversity of nonpublic school participants, to provide teachers with focused and relevant training in mathematics, and to conduct workshops and field-based study groups. This report describes three phases of the project: planning and development; workshops for teachers; and field-based study groups for participating teachers. Some outcomes and difficulties are also discussed. Appendices included are: (1) "Summary Evaluation Report" (including documents concerning the project, analysis of participating teacher questionnaires, announcement/reservation forms for workshops, and sample resource materials at workshops); (2) meeting agenda papers and letters concerning "School Selection and Teacher Recruitment"; (3) "Formative Evaluation Forms and Instruments"; (4) "Workshops and Study Groups Related Materials"; and (5) "Miscellaneous Materials." (YP)

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FOCUS ON THE MIDDLE ELEMENTARY GRADES: A Continuation Project to Promote Quality Mathematics Instruction in Nonpublic Religiously-Oriented Schools in New York City

BARBARA R. HELLER

CASE 07-88

September 1988

The project reported on herein was performed under a New York State Education Department Grant, EESA Title II, Project No. 132-88-0026.

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of the City University of New York
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EDUCATION FOR ECONOMIC SECURITY ACT, TITLE II
HIGHER EDUCATION COMPETITIVE GRANTS PROGRAM

FINAL NARRATIVE REPORT
Fiscal Year 1987-88

Please return two copies of the completed report to: Bureau of Grants Administration, New York State Education Department, Room 5B68, Cultural Education Center, Albany, New York 12230 **no later than September 30, 1988.**

GENERAL INFORMATION

Name of Institution: Center for Advanced Study in Education (CASE)

Mailing Address: CUNY Graduate Center, 33 West 42 Street, Rm. 300N
New York, New York 10036

Project Title: FOCUS ON THE MIDDLE ELEMENTARY GRADES: A Continuation Project to Promote Quality Mathematics Education in Nonpublic Religiously-Oriented Schools in New York City

Amount of Grant Award: $ 40,000 Project #: 13 2 -88-00 26

Project Director: Barbara R. Heller

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Area Code (Extension)

COOPERATING AGENCIES

List each of the school districts, nonpublic schools, teacher centers, postsecondary institutions, professional organizations, and other agencies involved in the planning, implementation, referral or evaluation of the project and indicate the nature of their participation:

Agency *	Plan	Implement	Referral	Evaluate
Agudath Israel of America, Inc.	[x]	[x]	[x]	[x]
Board of Jewish Education of Greater New York	[x]	[x]	[x]	[x]
Catholic Archdiocese of New York	[x]	[x]	[x]	[x]
Catholic Diocese of Brooklyn	[x]	[x]	[x]	[x]
Greek Orthodox Archdiocese	[x]	[x]	[x]	[x]
National Association of Episcopal Schools	[x]	[x]	[x]	[x]

* See Attachment #1, List of Participating Schools, 1987-88.

PARTICIPATING TEACHERS

Please provide the following data for the public and nonpublic teachers who were served by the project:

Public School Teachers

GRADE LEVEL			DISCIPLINE			SEX		RACE/ETHNICITY*					
ELEM	JR/MID	HS	MA	SC	FL	F	M	B	H	W	A	I	O
←					NOT	APPLICABLE							→

*(B) Black, (H) Hispanic, (W) White, (A) Asian/Pacific Islander, (I) Native American Indian/Alaskan Native and (O) Other - please specify.

Nonpublic School Teachers

GRADE LEVEL			DISCIPLINE			SEX		RACE/ETHNICITY*					
ELEM	JR/MID	HS	MA	SC	FL	F	M	B	H	W	A	I	O
78	-	-	78	-	-	70	8	← NOT AVAILABLE →					

*(B) Black, (H) Hispanic, (W) White, (A) Asian/Pacific Islander, (I) Native American Indian/Alaskan Native and (O) Other - please specify.

PROGRAM INFORMATION

A. List the specific objectives of your project and the criteria used to evaluate its success.

B. Describe the activities undertaken to achieve these objectives.

C. For those objectives not fully achieved, identify reasons or probable causes.

D. Describe the impact of these activities upon the teachers served by the project and cite participant changes -- cognitive, affective and behavioral -- that have taken place. Indicate the manner in which evidence of this impact was collected. Please attach copies or summaries of relevant data, reports, surveys or interviews.

E. Describe the impact of the project on the curriculum, students, and teaching practices of the cooperating public school districts and nonpublic schools.

ATTACHMENT #1

NPS MATH PROJECT, 1987-88
Participating Schools

(schools with asterisk are new this year)

BOARD OF JEWISH EDUCATION

Bialik School
500 Church Ave.
Brooklyn, N.Y. 11218
(718) 853-7100
Mrs. Miriam Vatkin, Principal

Yeshivat Mizrachi L'Banim
2810 Nostrand Ave.
Brooklyn, N.Y. 11229
(718) 258-4441
Rabbi Joseph Rothberger, Principal

Kinneret Day School
2600 Netherland Ave.
Bronx, N.Y. 10463
(212) 548-0900
Mr. Harold Levine,
Curriculum Supervisor

Beth Jacob-Beth Miriam School*
2126 Barnes Ave.
Bronx, N.Y. 10462
(212) 892-8830
Rabbi Josef Grossman, Principal

Crown Heights Yeshiva
6363 Avenue U
Brooklyn, N.Y. 11234
(718) 444-5800
Mrs. Shirley Rothberg, Principal

Yeshiva of Manhattan Beach*
60 West End Avenue
Brooklyn, N.Y. 11235
(718) 743-5511
Mrs. Beryl Faden, Principal

Yeshiva of Belle Harbor
134-01 Rockaway Beach Blvd.
Belle Harbor, N.Y. 11694
(718) 945-0309
Mrs. Judith Meltzer, Principal

CATHOLIC ARCHDIOCESE OF NEW YORK

St. Aloysius School
223 West 132nd St.
New York, N.Y. 10027
(212) 283-0921
Mrs. Angelita Bartholomew,
Principal

Our Lady Queen of Angels School
232 East 113th St.
New York, N.Y. 10029
(212) 722-9277
Sister Joellen Flynn, Principal

St. Joseph School*
139 St. Mary's Ave.
Staten Island, N.Y. 10305
(718) 447-7686
Mr. Robert Edelman, Principal

St. Bernard School
327 West 13th St.
New York, N.Y. 10014
(212) 243-6368
Miss Mary Kavanaugh, Principal

St. Stanislaus School
104 St. Marks Place
New York, N.Y. 10009
(212) 982-0740
Mr. Philip Spallino, Principal

St. Angela Merici School*
266 East 163rd St.
Bronx, N.Y. 10451
(212) 293-3365
Mr. Russel Warren, Principal

CATHOLIC DIOCESE OF BROOKLYN

St. John the Baptist School
82 Lewis Ave.
Brooklyn, N.Y. 11206
(718) 453-1000
Sr. Mary Jane Raeihle, Principal

St. Sylvester School
396 Grant Ave.
Brooklyn, NY 11208
(718) 235-4729
Sr. Sheila Conley, Principal

Our Lady of the Cenacle School
87-25 136th St.
Richmond Hill, N.Y. 11418
(718) 657-6690
Sr. Joan McGuire, Principal

Unity Catholic School*
991 St. John's Place
Brooklyn, N.Y. 11213
(718) 774-3330
Ms. Hyacinth Van Gronigen, Principal

Holy Spirit School*
1668 46th St.
Brooklyn, NY 11204
(718) 663-3959
Sr. Mary Sivillo, Principal

St. Anthony of Padua School
125-18 Rockaway Blvd.
South Ozone Park, N.Y. 11420
(718) 641-0212
Sr. Julia Mary, Principal

Holy Spirit School*
560 Sterling Place
Brooklyn, N.Y. 11238
(718) 638-3371
Sr. Katherine Hanrahan, Principal

GREEK ORTHODOX ARCHDIOCESE

"A. Fantis" School
195 State St.
Brooklyn, N.Y. 11201
(718) 624-0501
Mrs. Frederica Sagiani, Principal

Cathedral School*
319 East 74th St.
New York, N.Y. 10021
(212) 288-3216
Mrs. Barbara Katsos, Principal

AGUDATH ISRAEL OF AMERICA

Bais Yaakov Academy of Queens
124-50 Metropolitan Ave.
Kew Gardens, N.Y. 11415
(718) 847-5352
Mrs. S. Bergman, Principal

Yeshiva Ateres Yisroel*
8101 Avenue K
Brooklyn, N.Y. 11236
(718) 763-6777
Mr. Roy Neuberger,
General Studies Principal

Yeshiva and Mesivta Ohr Yisroel
66-20 Thornton Place
Forest Hills, N.Y. 11374
(718) 263-6242
Rabbi Raphael Nussbaum, Principal

EPISCOPAL SCHOOLS

The Cathedral School*
1047 Amsterdam Ave.
New York, N.Y. 10025
(212) 865-8400
Mr. Richard Ackerly, Headmaster

TABLE OF CONTENTS

New York State Education Department Cover Forms..... i
List of Participating Nonpublic Schools.....iv
TABLE OF CONTENTS.....vi
BACKGROUND..... 1
OBJECTIVES..... 4
PROJECT ACTIVITIES..... 6
Planning and Development: Phase I..... 7
Advisory Committee..... 8
Participating Schools..... 9
Needs Assessment.....13
Workshops for Grades 4, 5, and 6 Teachers: Phase II.....18
Study Group Sessions: Phase III.....26
CONCLUSIONS.....44
APPENDIX A, Summary Evaluation Report.....A1
APPENDIX B, School Selection and Teacher Recruitment.....B1
APPENDIX C, Formative and Evaluation Forms and Instruments.....C1
APPENDIX D, Workshops and Study Groups-Related Materials.....D1
Appendix E, Miscellaneous Materials.....E1

FOCUS ON THE MIDDLE ELEMENTARY GRADES: A Continuation Project to Promote to Quality Mathematics Instruction in the Nonpublic Religiously-Oriented Schools in New York City

During 1987-88, CASE, the Center for Advanced Study in Education of The City University of New York's (CUNY) Graduate School and University Center continued its program to promote quality mathematics instruction in the nonpublic, religiously-oriented schools in New York City. This year's activities focused exclusively on teachers who teach mathematics in grades 4, 5, 6 and combined those project elements that, based on prior experience, had the greatest likelihood of a positive impact on participants.

BACKGROUND

The Nonpublic School (NPS) Mathematics Project was a direct outgrowth of the MATHEMATICS CENTER, a recertification program designed and initiated in the Spring 1983 by CASE under contract to the New York City Board of Education.[1] This prototype effort

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[1] B.R. Heller, CUNY/Board of Education MATHEMATICS CENTER: Spring/Summer 1983. Center for Advanced Study in Education, The Cuny Graduate School and University Center, November 1983 (mimeo).

to increase the number and quality of public school teachers certified in mathematics not only met its goals of recruiting and/or retraining mathematics teachers for the public schools, but underscored a similar need in the City's nonpublic schools, led to the development of companion programs, and resulted in widespread implementation at both the elementary and secondary levels.

In 1985-86, with a grant from the New York State Education Department under Title II of the EESA, CASE conducted the first of a series of projects aimed at teachers in the nonpublic, religiously-oriented schools in New York City. In its initial year, that project, involving Catholic, Jewish, and Greek Orthodox Schools, consisted of three components: site visits to a total of 39 individual schools at which technical assistance was offered and principals and teachers were engaged in discussion and demonstration on site; seminars and conferences at which up-to-date information was disseminated and networks established among more than a total of 150 teachers and administrators; and formal courses involving up to a total of six undergraduate- and graduate-level math course credits--which 49 teachers, including one principal, completed during an intensive summer semester. According to the external evaluator, "this model demonstration project... was exemplary primarily because it responded to a pressing need and manifested

significant positive characteristics."[1]

For 1986-87, partly as a result of funding decisions, the continuation project emphasized only one of the prior year's thrusts: the on-site visits to the schools.[2] A total of 20 schools took part in the project, representing the same school systems as the previous year, but also incorporating the Greek Orthodox Archdiocese. Most of the 135 people that were involved in project activities were teachers in grades 3 to 6, but administrators, teachers of reading, and of music, language arts, religion, science, social science, computer science, and keyboarding were reached as well.

The second year's on-site technical assistance consisted of consultant visits to each school in the Fall and again in the Spring. At the school, the technical advisor either worked individually with two classroom teachers, and/or conducted workshops for larger groups of teachers that frequently included an in-classroom demonstration.

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[1] B.R. Heller, A Model Demonstration to Improve Mathematics Instruction in Grades 5-9 in Nonpublic Religiously-Oriented Schools in New York City. CASE #05-86, The Graduate School and University Center, The City University of New York, November 1986.

[2] B.R. Heller, A Continuation of a Model Demostration for Quality Mathematics Instruction in Nonpublic Religiously-Oriented Schools in New York City. CASE #04-87, The Graduate School and University Center, The City University of New York, September 1987.

FOCUS ON THE MIDDLE ELEMENTARY GRADES: A Continuation Project to Promote Quality Mathematics Instruction in Nonpublic Religiously-Oriented Schools in New York City

BARBARA R. HELLER

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Again, the project was judged as highly effective by both teacher participants, principals, and by the external evaluator. One principal described the experience as "unique...an eye-opener for the faculty, myself, and above all for the students." She indicated that "we were all inspired and benefited greatly (from the visit)" and requested additional, more frequent opportunities of this kind in the future.

A somewhat increased level of finding in 1987-88 enabled the Project Staff to carry out two major activities--grade-specific workshop meetings and customized opportunities (by grade and geographic location) for technical followup.[1] These activities, which will be described in detail below, met the project's overall goal of improving the knowledge of mathematics and the teaching skills of grades 4 to 6 teachers in selected nonpublic religiously-oriented schools in New York City.

OBJECTIVES

Specifically, as operationalized, the objectives for the current (1987-88) project year were to:

1. Increase the number and diversity of nonpublic school participants by:

   * expanding and continuing the activities of the project Advisory Committee to include new groups of religiously-oriented school representatives. The Advisory Committee will continue to have a

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[1] Note that funding considerations did not permit the formal math education component (scheduled as a Summer 1987 activity in the original proposal for 1987-88) to be implemented.

monitoring and public relations role as well as substantive input into the selection of schools and assessment of needs of the target teachers; and

* enlisting more diverse and a larger number of schools, to a total of 26, to include schools that took part in last year's project, additional schools from the same systems, and new schools that are affiliated with the Greek Orthodox Archdiocese and the National Association of Episcopal Schools.

2. Provide teachers with narrowly focused, relevant training in mathematics--in selected mathematical knowledge and teaching techniques--by:

* limiting, to the extent practicable, participation to teachers in grades 4, 5, and 6 --the middle elementary grades;

* designing training and delivery formats to be as grade-specific and responsive to school needs as possible; and

* conducting systematic needs assessments to develop materials and activities for participants that will enable them to model demonstration lessons in their own elementary-level classrooms.

3. Conduct the Fall workshops and Spring field-based study groups to:

* maximize participation by using content and staff development strategies that meet teachers' needs and actively involve them in learning;

* incorporate sample materials applicable to elementary school children and sample lessons involving these and other similar materials;

* motivate teachers to explore and experiment with materials, resources, and activities that have been found to be effective in the teaching and learning of mathematics at the elementary level; and

* encourage teachers from schools with different religious affiliations to meet together and form informal associations and stronger working relationships.

In-service training activities were designed to meet these objectives which, together, should result in improving teachers' pedagogical skills and assisting them in implementing the Regents Action Plan to Improve Elementary and Secondary Education Results. These activities were selected from a large array of staff development techniques and were based on the Project Staff's past successes in working with this target population of teachers. They reflected our concern with assessed teachers' interests and skill levels, teaching schedules and other school and personal responsibilities, as well as with teachers' prior training in and orientation to mathematics. Furthermore, the training content and materials incorporated the most up-to-date research about how young children learn mathematics and also balanced formal and informal techniques teachers could adapt to their own styles and resources.

PROJECT ACTIVITIES

The 1987-88 project consisted of three phases: Planning and Development activities constituted the first phase and consisted of staffing the project, convening the Advisory Committee, selecting schools and teachers, and conducting a needs assessment of teachers of grades 4, 5, and 6. In the second phase, Workshops were held--separate meetings at the end of the Fall semester for 4th-grade, 5th-grade, and for 6th-grade teachers. Field-based Study Groups for participating teachers, organized on a geographic basis, took place during the project's third phase.

Evaluation activities, with a formative emphasis, conducted by Project Staff, and more comprehensively by an external Evaluator, documented all aspects of the project.[1]

Planning and Development: Phase I

As noted, this initial aspect of the project was comprised of several types of preparatory activities which will be described in the approximate order in which they occurred.

Project Staffing. The Project Staff consisted of a Director (the author of this report); an Associate Administrator, a graduate of the Graduate School of The City University of New York; and three consultants--the technical Evaluator, and two University mathematics professors. One of the professors currently directs the Mathematics Learning Center at Hunter College; the other is an expert in elementary math education at Queens College. Both have lectured extensively, conducted numerous workshops for teachers, and authored several books and articles for professional journals.

The consultants and staff met several times during the year, and especially in the initial stages, to discuss the goals, objectives, and theoretical orientation of the project and to plan the activities.

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[1] The report by the external Evaluator, Appendix A, follows.

Advisory Committee. In addition to Project Staff, the three consultants, the Director of CASE, and the University Dean for Community Development--all of whom served on this year's Advisory Committee in an ex-officio capacity--the expanded group of advisors consisted of representatives from each of the following organizations: Agudath Israel of America Inc.; the Board of Jewish Education of Greater New York; Catholic Archdiocese of New York; Catholic Diocese of Brooklyn; Greek Orthodox Archdiocese; and the National Organization of Episcopal Schools.

The Advisory Committee had both formal meetings,[1] at which most members were present, and more informal discussions with Project Staff. As can be seen in the Agenda for the September 9th meeting, the major business initially consisted of the selection of schools and participating teachers and the scheduling of the workshops and study-group sessions. Continuous dialogue with individual and small groups of Advisors served not only to amplify these issues, but also provided staff with on-going feedback from the schools' administrations and input into the shaping of all subsequent activities. (It should be noted that the Advisors, individually and collectively, maintained active interest in the project--and have done so since its inception--assisting staff in numerous ways, always available to respond to specific

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[1] See Appendix B for a detailed agenda of the first full meeting of the Advisory Committee on September 9, 1987.

requests, and actively promoting the project both within and without their school systems.)

As noted, the Advisory Committee's first order of business was to nominate schools to take part in the project, using mutually agreed upon selection criteria, and to orient the old and new schools and prepare them for their responsibilities vis-a-vis the project. A description of the schools that were selected to take part in this year's project follows inmediately.

Participating Schools. A total of 26 New York City nonpublic schools were chosen for the project this year. Criteria for their selection were established at the first meeting of the Advisory Committee, and basically consisted of an expressed interest in the project and agreement to cooperate with staff and consultants in carrying out its objectives. The total number of schools (26) was allocated among the systems proportionately to reflect the approximate size of each of the major denominational groups with students enrolled in nonpublic schools in the five boroughs of New York City. Of the 26 schools, 20 were to be prior participants; the six additional schools, new to the project, were to be divided among the groups and a school from the Episcopal denomination was also added. This resulted in a total of seven schools that were part of the Brooklyn Catholic Diocese, six that were affiliated with the New York Catholic

Archdiocese, seven schools that belonged to the Board of Jewish Education, three Agudath Israel of America schools, two schools from the Greek Orthodox system, and one Episcopal school.

As was the case in previous years, the schools that the Advisory Committee members nominated differed from one another in such things as size and in demographics of the school population, as well as in the background, interests, and motivations of the teaching staffs. However, the concentration on grades 4 to 6 was expected to largely overcome most inter-school variations. In other words, the focus on three contiguous grades was narrow enough to ensure that commonalities among participants would result in the attainment of the project's goals.

After the schools were selected and contacted, which was done by the respective Advisory Committee member, Project Staff called each principal and introduced the project and confirmed their interest. We then sent a letter to each of the principals. (See Appendix B.) The letter described in detail the scope of the program, its objectives, and the various activities that would be offered. This letter was followed by several telephone calls to each principal at which time the Project Director reviewed the project's goals and explained the basis for selecting teachers. It should be noted that in every school the principal or his/her designee made the actual

selection of the participating teachers.

Once the details were fully explained, 23 of the 26 schools originally nominated by the Advisory Committee immediately agreed to take part in the program. Three schools (two Catholic, one Jewish) were not interested in participating. The reasons varied: one principal said that textbook companies were also offering workshops, making ours "redundant". According to another principal, her teachers didn't want to travel the distance to the workshops. The principal of the third school said that the teachers in grades 1 and 2, not grades 4, 5, and 6 in her school needed help. These three schools were replaced with three others proposed by the appropriate Advisory Committee member; one of the replacement Catholic schools, however, also did not want to participate. The reason according to the principal, was that the year before, when the consultant came to the school, the project was "free"; now it would cost them money for substitute teachers. Another replacement finally gave the project the full complement of 26 schools from which to recruit teachers. In addition, the principals of a Greek Orthodox elementary school and a Jewish day school asked to send teachers to the workshops on an informal, space-available basis even though they were not on the official list.

As noted above, of the target schools, 13 were Roman

Catholic, 10 were Jewish, two were Greek Orthodox, and one was Episcopal. They were geographically diverse: six were located in Manhattan, three in the Bronx, 11 in Brooklyn, five in Queens, and one in Staten Island. Fifteen of the schools had participated in the 1986-87 project; the remaining 11 were new to the project in 1987-88.

The project was intended to serve grade 4, 5, and 6 mathematics teachers in each of the schools. It is the author's belief, supported by the research literature, that elementary school teachers need special attention to make up for their lack of prior preparation in mathematics, to improve their attitudes toward mathematics which, in turn, affect their willingness to teach and otherwise engage in mathematical activities, and to prepare them for the curricular changes in the mathematics syllabus brought about by the Regents Action Plan. Working with teachers of grades 4, 5, and 6 is especially important. It is at this stage that young people's attitudes toward mathematics develop. It is also the point at which their understanding of mathematical concepts and operations must be formalized. Therefore, improvement in the knowledge and confidence of grades 4-6 teachers should not only forestall the formation of negative attitudes toward mathematics among young learners, but should also set the groundwork for the further development of positive, solid mathematics skills.

A total of 78 teachers was initially suggested for participation by their principals, approximately an average of three per school, or one per grade per school. The actual number of teachers that were recommended for the program ranged from one to six per school. Most were grade 4 to 6 mathematics teachers, although there were several third-grade and seventh- and eighth-grade math teachers nominated, as well as one teacher who taught math to the children in grades 5-9.

All teachers received a letter from Project Staff (Appendix B) welcoming them to the project and describing the upcoming activities. Recipients were invited to call us with questions or for elaboration, and several did. Among their questions were requests for more information concerning the locations at which the activities were to be scheduled, including times and travel directions, and questions about "homework" and other obligations they might incur as participants. For the most part, however, the telephone calls seemed to reflect some curiosity about the project and about the Workshop and Study Group leaders.

Needs Assessment. Although the Project Staff and consultants had some preconceived ideas, and some past experiences about the needs and interests of the target teachers, we conducted a brief formal self-assessment of their

background skills and knowledge. Called the "Participating Teacher Questionnaire"[1], this 2-page survey was sent to all grades 4, 5, and 6 teachers from the target schools in November 1987.

The questionnaire included some demographic information about the participating teachers and also addressed the use of manipulative materials in general, seven specific types of manipulatives, and 19 mathematical topics. Responses were analyzed separately for each grade level so as to be useful for planning each of the three Workshops. Table 1 on page 15 summarizes the respondents' feelings of competency, based on self-ratings, using a 5-point scale (where 1.0 = not at all competent and 5.0 = extremely competent), to the use of manipulative devices and to particular topics, respectively.

As can be seen in Table 1, most respondents--especially the 4th and 6th grade teachers, felt much less than even "moderately confident" about any of the listed manipulative materials and on several items, indicated that, on average, they were somewhat less than "not particularly confident." Grade 4 teachers were most comfortable with Cuisenaire rods (2.6) and least so with Decimal Blocks and Polyminoes (1.7). Grade 5 teachers rated themselves as most confident with Geoboards (3.0), and least

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[1] See Appendix C for a copy of this questionnaire and all other instruments administered by Project Staff this year.

TABLE 1

TEACHERS' SELF-RATINGS OF COMPETENCY WITH MANIPULATIVE MATERIALS AND SPECIFIC MATHEMATICS TOPICS

ITEMS TO BE RATED	Average Ratings[a]		
	Grade 4 (N=17)	Grade 5 (N=15)	Grade 6 (N=15)
Manipulative Materials (Q. 2):			
Attribute blocks	2.1	2.2	1.4
Cuisenaire rods	2.6	2.5	1.8
Decimal blocks	1.7	2.5	1.8
Geoboards	2.1	3.0	2.6
Pattern blocks	2.3	2.3	2.0
Polyminoes	1.7	2.2	2.0
Tangrams	2.0	2.5	2.4
Mathematics Topics (Q. 4):			
Algebra	3.6	2.0	3.4
Approximation and estimation	3.6	3.2	3.8
Logic; "If-Then" reasoning	3.4	2.8	3.4
LOGO	1.7	1.8	1.8
Rational numbers (fractions, decimals...)	3.3	3.2	3.8
Measurement (including Metric System)	3.3	3.0	3.6
Probability and statistics	2.9	2.0	2.6
Problem-solving	3.7	3.4	4.0
Spatial visualization	2.7	2.0	2.8
Transformational geometry	2.0	1.4	2.4
Numeration	4.0	2.5	4.2
Computation	4.3	3.5	4.8
New graphics	1.5	2.8	1.2
Calculators and computers	1.9	1.8	2.2
Patterns and functions	2.3	2.8	2.6
Matrices	2.2	2.0	2.2
Non-numerical operations	3.3	2.8	3.4
Mental arithmetic	3.9	3.0	4.0
Applications of mathematics	3.4	2.8	3.4

[a]Average scores are based on the following scale: 1.0 = Not at all competent; 2.0 = Not particularly competent; 3.0 = Moderately competent; 4.0 = Competent; 5.0 = Extremely competent

confident with Attribute blocks and Polyminoes (2.2). The 6th-grade respondents were most at ease with Geoboards (2.6) and least easy using Attribute blocks (1.4) When asked which other, if any, manipulatives they had worked with, one or two fourth- and fifth-grade teachers each mentioned Base 10 blocks, Multilinks, Fraction bars, Dice, Uniflex cards, and Dominoes. No one claimed great dexterity with any of these materials, however, but most all respondents said they would like to become more proficient with all of these aids.

In contrast to their general low level of confidence vis-a-vis manipulatives, questionnaire respondents tended to feel more confident about the specific mathematics topics (listed in Table 1, page 15). Using 3.0 ("moderately confident") as an average level, it can be seen that on 11 of the 19 items (58%), grade 4 teachers rated themselves above "average". Similarly, grade 6 teachers also felt at least moderately confident when it came to 11 topics, while 5th-grade teachers' ratings, in contrast, were at 3.0 or better on only six items (32%). (Note that 4th and 6th grade teachers scored 3.0 or above on the identical set of topics; the pattern for grade 5 teachers was also very similar.)

The mathematics topics with which teachers tended to feel least comfortable were algebra (grade 5 only), LOGO, probability and statistics, spatial vizualization, transformational geometry, numeration (grade 5 only), the new graphics, calculators and

computers, patterns and functions, and matrices. It is critical that many of these comprise not only the new curriculum in mathematics, as mandated by the Regents Action Plan, but also reflect relatedly, the most current thinking about what constitutes the best approaches to teaching and learning.

On the open-ended questions, respondents tended to want increased feelings of competency and/or desired to learn about new materials and technologies (including computers). Specifically, teachers wanted to "get over my math phobia", "learn about (or feel more comfortable with) manipulatives", "learn basic methods", "learn about methods for dealing with slow learners" , and "learn new techniques". One teacher said that "any help would be welcome", while several others indicated that they would just like to understand mathematics better.

These results, when reviewed by Project Staff and consultants, together with the self-ratings, strongly suggested that the workshops might profitably focus on a variety of manipulative materials that have applicability to a range of mathematical concepts that are introduced and/or reinforced in grades 4, 5, and 6 and which, moreover, have appeal to diverse students: so-called average students as well as those performing above and below grade level. This, then, became the core of the three workshop meetings.

Workshops for Grade 4, 5, and 6 Teachers: Phase II

Two consultants, experienced in staff development activities for elementary level teachers and committed to the use of manipulative materials as a significacnt approach to mathematics, conducted the workshops.

One, a professor of Mathematics Education at Queens College, CUNY, was responsible for the meeting of 4th-grade teachers. She has had extensive experience, both pre-service and in-service, in the training of elementary and middle school teachers, is widely published in the field of elementary school mathematics, and is active in professional and community organizations. The consultant who conducted the workshops for grade 5 and for grade 6 teachers is a Professor of Mathematical Sciences and Director of the Mathematics Learning Center at Hunter College, CUNY. She has taught in both elementary and junior high schools, been a math supervisor, led workshops throughout the country, and authored several textbooks used extensively in mathematics education programs.

The consultants conducted and designed, with imput from the Project Staff and Advisors, the Fall semester Workshop meetings and the Spring Study Group sessions. As noted, the emphasis in all Workshops was to be on the use of manipulatives in the classroom with specific activities and illustrations drawn from

the fourth-, fifth-, and sixth-grade mathematics curriculum. Specific Workshop topics would include transformational geometry, measurement, similarity, congruity, and constructions (grade 4); fractions, decimals, and percentages (grade 4); numbering systems through rational numbers (grades 4,5); coordinate geometry (grades 5, 6); and probability and statistics (grades 5, 6). Each meeting would also review the New York State mathematics curriculum for the grade; discuss the use of calculators; and talk about micro-computers--what can be done with them and what software is available. A problem-solving emphasis will be a theme throughout all activities and participants would be provided with list of resources, reading materials, and exercises to test out in their classrooms for followup in the Study Groups. The budget also allowed for individual sets of manipulatives for teachers.

Attractive brochures were created to promote each of these Workshops, and samples are appended. (See Appendix D.) All three brochures were sent individually to <u>all</u> of the teachers nominated by the school principals, as well as to the principals themselves, and an effort was made to recruit teachers to more than one workshop in the belief that, for example, there is a great overlap in content and methodology between the grade 4 and 5 curriculum and between grade 5 and grade 6. Each brochure contained an agenda, a description of the Workshop's content, and a short bio of the Workshop leader. There was a reservation form

which we requested teachers complete and return to help us in the Workshop preparations. Note that these meetings were also open to administrators and supervisors from the target schools and to selected other people--the Advisory Committee representatives, for example (several of whom attended all three meetings), as well as to other representatives from the nonpublic school systems in New York City. Indeed, one workshop was attended by a grade 4 teacher from a nonpublic school in New Jersey.

The Workshops took place on January 19, 1988 (grade 6), January 21, 1988 (grade 4), and January 26, 1988 (grade 5). All were held from 1:00-4:45 p.m. The days of the week chosen, Tuesdays and Thursdays, reflected the principals' wishes and the consultants' schedules; they were also believed to be best for teachers. All three meetings were held at The Graduate School and University Center, CUNY, in mid-Manhattan, a location accessible to all forms of public transportation (but not necessarily convenient for cars because of the cost of parking.) Light Kosher refreshments, coffee and dessert, were served.

Each participant received a packet containing various types of manipulatives specially assembled and packaged for the project by Cuisenaire, Inc. Each package consisted of a Geoboard with rubber bands, two sets of Tangrams, a set of wooden Pattern blocks, and Cuisenaire rods; a brochure describing these and other commercially-made materials, with prices, was also

included. The participating teachers used this material during the Workshop meeting and took it back to their schools.

Generally, the three Workshops followed a similar format, starting with a welcome from the Director of CASE. The Project Director, who acted as host, explained the overall plan for the session and then introduced the leader who conducted the remainder of the meeting. Each consultant first talked about using manipulatives in real classroom settings and described how students react, and so on. She then went on to give demonstrations of how each type of manipulative could be used to illustrate particular mathematics concepts (e.g., fractions, congruity) and operations (e.g., long division). Both leaders used instructional sets of the same manipulatives the participants were given, but the demonstration sets could also be displayed on an overhead projector. Some time was also devoted to discussing how teachers could obtain these demonstration sets as well as sufficient other materials for all the students in their class, as well as to describing how teachers and their students could construct manipulatives from paper and other easily available and inexpensive materials.

Both consultants also distributed a great many handouts illustrating activities for each type of manipulative that the teachers could use in their classrooms. The Workshop participants were themselves involved in these activities and,

overall, interest was high and their excitement was apparent. The noise-activity level in the room frequently modeled what they could expect from students.

The leaders stressed the importance of using manipulatives to build mathematics concepts. They also talked about how the conceptual basis that manipulatives provide can help students do mathematics even much later on in school. They encouraged the participants to have their students develop their own problem-solving approaches, emphasizing the multiplicity of ways problems could be solved and how the use of manipulatives fosters this creative individuality. Each point was illustrated in a concrete manner by the consultant and with several specific activities. All three Workshops were concluded with a little "assignment" that was presented and explained in a low-keyed way as voluntary and not a prerequisite for one's continued participation in the project. (The specific assignment will be described in the section of the report on the Study Group Sessions, below.)

Workshop attendance was generally good. A total of 53 different teachers (including one principal) attended the meetings--68 percent of the targeted number, but a smaller number than those nominated by the school principals. The various nonpublic school systems participated in proportion to their participation in the project overall, but some schools sent several teachers while others on the list sent none.

A total of 25 people from 22 different schools attended the grade 4 Workshop--more than the number who had reserved places. (Five people showed up without reservations, and two who had said they would come did not.) Thirteen people came to the 5th grade meeting, although we had expected 22 teachers. (Eleven people returned their reservation form and didn't show up, while two others came without letting us know beforehand.) For the grade 6 Workshop, we had received a total of 18 reservations--and only 15 of these people attended. It should be noted that no one actually came to more than one of the Workshops although one person registered for all three and four others registered for two.

What explains the attendance patterns? When asked (on the registration form) why they wanted to attend, most people said either they wanted to learn about manipulatives (30%) or wanted to improve their teaching skills (30%). Several gave no particular reason (10%), while a variety of other miscellaneous reasons were offered, including: "because it would be beneficial", "for professional growth", and because "I have not attended an in-service math program in 14 years". Thus, it would seem from these responses, as well as from the needs assessment, that the Workshops did indeed emphasize skills and practices in which the target teachers were interested.

Schedules and timing also reflected schools' and teachers' needs. When an informal followup series of telephone calls was made to the schools, we were told that the "distances were too great" and that "teachers were afraid to use public transportation," so that if one teacher couldn't or wouldn't go, it was unlikely anyone else from that school would attend. Moreover, we were informed, last minute obligations at school (and at home), including the administrations' inability to provide classroom coverage, prevented the attendance of several interested teachers. Some of those issues were designed to be addressed by the small-group study sessions scheduled for Spring.

Participants were asked to complete an End-of-Workshop Rating Form (see Appendix C for a copy of this Form). Almost everyone (96% of grade 4, 100% of grade 5, and 100% of grade 6 teachers) complied. The overall ratings for grades 4, 5, and 6 were 4.5, 4.5, and 4.2, respectively, midway between "good" and "outstanding" on the 5-point scale. There were very few comments to the specific sentence completion stems. One participant each indicated wanting <u>more information on</u>: "different materials" (grade 4), "how to teach theoretical math" (grade 4), "teaching decimals using manipulatives" (grade 5); "problem-solving", "word problems", "teaching long division to slow learners", and using manipulatives to teach the four basic arithmetic operations" (grade 6). Other respondents indicated that <u>more time was needed</u>: that "there wasn't enough time", and that "full

day Workshops" are recommended.

Respondents tended to be more verbal when it came to expressing their overall reactions. Grade 4 teachers said such things as: "This will allow my students to enjoy learning through doing--which is practical"; "You don't read about making a cake, you make it! Just like this session"; "I got a better insight into 'hands-on' materials"; "I wish my school would cooperate and get us new materials. The text I use is from 1976!"; "Very practical"; "Helpful"; "I felt stimulated; good motivation"; Down-to-earth presentation"; "Well organized; excellent"; "For students, seeing will be believing"; "The goody bag of materials!"; " I learned new ways to broaden my teaching"; and "Covered a lot in a short time".

Grade 5 teachers commenting about the other consultant made similar statements: "Excellent presentation"; "Practical and informative"; "Made me want to start using them"; "Grateful that she allowed us to 'play' with them first and I will let my kids do it too"; "Impressed with how to use the calculator as a tool, not a crutch"; "Quite enlightening"; "Well thought out"; "Increased my repertoire of materials"; "Kids will love these"; "I will try them out very soon"; "Makes me less wary of using manipulatives in the upper levels"; and "Seems useful, but expensive to purchase".

Comments about the sixth-grade workshop included the following: "Well-prepared"; "Outstanding, but rushed"; "New information presented in a simple way; there is a need for more workshops like these; "I feel comfortable and I learned a lot"; "Very practical"; "Everyone was friendly": "Makes math more interesting and less scary"; "Makes me feel math could be fun"; and "Teaching aids and methodology were outstandingly good; useful information was given". Only one teacher felt that the workshop "did not help me use new things on a day-to-day basis."

In light of these reactions staff and consultants had high hopes for the Study Group Sessions.

Study Group Sessions: Phase III

In an attempt to provide the target teachers with followup to the Workshop meetings and with individualized support (which in 1986-87 was accomplished through visits to each of the schools in the project), a series of field-based Study Groups was planned for grade 4, 5, and 6 teachers. As were the large groups meetings, these too were organized on a grade-level basis with teachers from the contiguous grades also encouraged to attend.

The study sessions were also convened on a borough basis: in Manhattan to be accessible to teachers from schools in the Bronx and Manhattan; in Queens; and in Brooklyn which would

conveniently accommodate teachers from Staten Island schools as well as Brooklyn schools. Thus, three Study Groups were scheduled for grade 4 teachers (Manhattan-, Queens-, and Brooklyn-based), three for grade 5 teachers, and three study sessions for sixth-grade teachers. A total of nine sessions was planned for the Spring. It was intended that these sessions would attract all the teachers who took part in the Workshops, as well as those who had been nominated and/or invited and did not attend. We also anticipated that teachers would come to more than one Study Group--either to all in her/his borough, irrespective of grade, or to all for his/her grade, irrespective of location.

The small-group meetings took place over a period of three weeks from April 18 to May 5, 1988. The first weeks' sessions took place at the City University Graduate Center in mid-Manhattan and consisted of a:

Grade 4 meeting on Monday, April 18;

Grade 5 meeting on Tuesday, April 19; and a

Grade 6 meeting on Thursday, April 21.

The second series of Study Groups was held in Queens:

Grade 4 met on Monday, April 25;

Grade 5 met on Tuesday, April 26; and

Grade 6 met on Thursday, April 28.

The sessions for grades 4 and 6 were held at Queens College, CUNY, while the meeting for the fifth-grade teachers was at

LaGuardia Community College, CUNY.[1]

The final series of Study Groups was set up at yet another neutral site--New York City Technical College, CUNY, in Brooklyn --and took place as follows:

Grade 4 meeting held on Monday, May 2;

Grade 5 meeting held on Tuesday, May 3; and

Grade 6 meeting held on Thursday, May 5.

Note that the same consultant who conducted the Workshop for a particular grade also conducted all three Study Sessions for that grade.

All Study Groups were scheduled from 1:00 p.m.-4:30 p.m. and arrangements were made for parking and for light refreshments. All teachers from the target schools who had been invited to participate in the project received individual invitations announcing the Study Groups. To provide participants with encouragement and sufficient notice in which to make plans to attend a Study Group, between the conclusion of the Workshops and the start of the Study Group sessions, Project Staff sent teachers and administrators several reminders, including a "Save-a-Date" memorandum on February 16; another memorandum on March

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[1] The author would like to acknowledge the cooperation of the Department of Education, Queens College, the Division of Cooperative Education, LaGuardia Community College, and the Division of Continuing Education at New York City Technical College--and to thank the administrative and support staff for their assistance

10 accompanied by the "Manipulative Activity Form"--one version for teachers who took part in Workshop, the other for teachers who did not; and a final notice dated March 18 which again included the schedule and travel directions and a Reservation Form to be completed and returned by April 6, 1988. The school principals also received copies of these announcements (which are included in Appendix D.)

As conceived and briefly alluded to above, the main purpose of the Study Groups was to enable teachers to interact with experts in mathematics on a individual (or small group) basis in a more cost-effective manner than that of sending consultants to visit teachers on site at their individual schools. As intended, these Study Groups would enable a few teachers to explore together specific, pre-assigned content and/or methodological issues in an in-depth manner. Working with an expert consultant who woud lead the discussion, participants would be encouraged to talk about their classroom experiences as they pertain to particular concepts, operations, and classroom management issues; discuss their reactions to the materials and assignments given at the Workshops, providing feedback about their effectiveness; and cooperatively study ways in which to tailor instruction to the needs of both slow and accelerated learners. In this way, we believed, teachers would be able to share and to learn from one another, thus setting the stage for local networks that cross denominational school lines and that might also engage college

and university people.

However, the primary focus of the Study Groups was to be on the use of manipulatives in the classroom. All participants at the Workshops received an assignment--to "make up three activities for your students involving one or more of the manipulative devices that had been discussed--or others of your choice". (Teachers could try activities that were not original, including ones they got as written samples in the Workshop.) They then were asked to describe their experiences with students, discussing such things as what they might "do differently next time", what were "some of the problems" they observed, and what were some student reactions. The help of both the consultant (including private phone numbers) and/or the Project Director were offered.

In early March, as noted, staff designed and mailed a "Manipulative Activity Form" to all teachers--those who had participated in the Workshops and those who had not--which, we believed, would make it easier for them to complete the assignment. Again, we emphasized that the assignment was voluntary but that completing the form could be useful to themselves and to their fellow teachers--it would help them organize "what they did, how the students responded, and what suggestions and ideas they might have for other teachers". We again included offers of assistance.

The attendance at the Spring Study Group sessions was generally quite poor, totalling 18 people for all sessions combined, including one teacher who came to two meetings. No one attended three of the sessions (April 26 [gr. 5], May 3 [gr.5], and May 5 [gr. 6]) and at a couple of others, there was only one or two teachers; on the other hand, six teachers came on April 18. There does not seem to be any particular explanation to this attendance pattern.

Earlier groups (those in April) tended to be slightly better attended than the May sessions; and attendance by grades 4 and 5 teachers was higher than that of grade 6. This suggests that as the school year winds to a close, it becomes increasingly difficult for teachers to meet off site. We also suspect that many teachers feel that six graders have outgrown the need for or responsiveness to manipulatives.

The Reservation Form responses led us to anticipate a somewhat larger turnout at all sessions with one exception. Although the consultant, the Evaluator, and one member of the Project Staff (either the Director or Associate) came to each group prepared with refreshments, materials, and planned activities to talk about, at the meeting at which we had not expected anyone, only the staff member was present initially: the consultant was nearby, however, at her office and on-call. As it

happened, we had one teacher walk-in so we phoned the consultant who was there in 15 minutes. That "Study Group" took place. (At the beginning, both the teacher and consultant felt a little awkward, but recovered when they started to discuss, in ernest, the full range of the teacher's concerns with mathematics, including her own anxieties and lack of confidence, the scarcity of up-to-date resources in her school, how to motivate students who "give up" too soon, and how to teach long division using Cusineire rods. Note that the Project Staff member left when the consultant arrived so as not to overwhelm the teacher.)

What factors account for the drop in attendance between the January Workshops, involving 53 teachers, or 68 percent of those targeted, and the Study Groups involving only about one quarter (23%) of the targeted teachers? There are some hints about why this might have happened. Probably the most significant reason has to do with the "assigned" project--that is, the suggestion to try the manipulatives with students and to write-up the experience. The fact that only seven of the 18 attenders actually did so shows that most teachers, for whatever reason, did not. Those who did not complete the assignment in writing but who came to Study Group anyway (all of whom had tried manipulatives) are probably very much in the minority. Their apologies and their asking if the "could stay anyway" suggests that a large number of other teachers who also did not do the <u>formal</u> assignment was too embarrassed to come despite the

assurances that the assignment was voluntary. This explanation for the low attendance is particularly favored by one of the consultants who stated, "I think many teachers were perfectly willing to come learn about some things and get materials but did not want to do any work or discuss their own ideas.... Unfortunately, this results in them 'getting' much less than they could have." (Appendix E.)

A related factor, as explained to us by one of the principals we called to promote attendance at the Study Groups, involved teachers' expectations about in-service training in general, and about this project's approach to mathematics in particular. It seems that her teachers (who had appeared enthusiastic about the Workshop, and who had turned in very positive Rating Forms) had told her that what they did not like about the program was "having to do the math themselves"--probably meaning working with the manipulatives, hands-on, as the consultant was demonstrating. They had expected to be "shown what to do, not to have to do it" themselves was how they explained it to the Principal who explained it to the Project Director. In other words, some teachers do not yet appreciate that "<u>doing</u> math is a 'verb'": that learning mathematics--whether learning as a student in a classroom or learning as a teacher how to teach it to students involves an active stance, a repetitive doing, including practice and experimentation. This is just one of the important messages that manipulative devices deliver.

Thus, it would seem that at least some teachers are willing, even excited about being shown new strategies and techniques and ways of doing mathematics with their children, but are not sufficiently committed or motivated--nor, to be fair, may they have the time or resources--to put in the extra effort required to achieve real competence and ease. While they may want to try new things, many are not willing to do so in a rigorous way nor to report on the outcomes of their activities in a formal way.

(Other explanations for the low attendance at the Study Group sessions have to do with the time of year, religious schedules, and a general uneasiness about travel. These will be discussed briefly below.)

When attempting to work with the various religious school systems, the scheduling of activities becomes a major concern. In addition to the late spring being a very busy time of year in all schools, public and nonpublic, it is also a time filled with many religious observances: the major holidays--Easter, Greek Orthodox Easter, and Passover--which frequently do not overlap, effectively take 2 1/2 to 3 weeks out of the calendar; other holidays, such as Purim and certain Saint Days, also affect scheduling. These school closings, coupled with the fact that neither Friday afternoons (before the Jewish Sabbath) or Wednesday afternoons (when public school children go to the NPS

for religious instruction), create added difficulties in planning events that encompass more than one religious group. While not impossible, any arranged date in the spring is certain to occur close to a day on which some schools are on holiday, thereby making it problematic whether the principal will allow or encourage teachers to be out of school for a workshop. The problem becomes even more exaggerated when two other factors are considered.

First, in terms of motivation, the fact is that for several of the NPS systems, promotion, tenure, and/or salary increases are not necessarily tied to in-service credits or advanced degrees. Teachers, therefore, have to be <u>internally</u> motivated to take part in these types of activities. While in some cases they may have the support of the principal--some principals clearly recognize the worth of these activities--it is important to remember that the use of substitute teachers (the second factor) is not as easily arranged in the nonpublic as in the public schools, nor as cost-free to the school.

Other than the problems involved in scheduling, and the related issues, is the fact that the NPS with whom we have been working are spread out geographically across the entire City, often more than an hour's travel time away from the site of the planned event. Since many of the elementary schools we are serving are also very small, with only one fourth- or one fifth-

grade teacher, for example, this often means that a particular teacher is the only one from her/his school to take part in the project. She/he, therefore, has to travel alone to a distant site where he/she probably does not know any other participant and, furthermore, make the the trip back home alone at the end of the day on public transportation. For many NPS elementary teachers who walk to their neighborhood school, or take a short car ride, travel is the biggest negative in their decision to participate in the project.

Indeed, in more than one instance, at the principals' request, we tried to "buddy up" teachers from different schools to travel together. In those cases where it was not possible to do so--because of geographic factors--the teachers elected not to come to the Workshops and/or Study Group.

These difficulties notwithstanding, teachers who attended the Study Groups were interested in learning more about mathematics and math pedagogy and were specially prepared (although not necessarily with a completed formal assignment) to talk about the use of manipulative materials in the classroom. Based on their reports, both oral and written on the Manipulative Activity Form, all Study Group attendees had tried one or more exercises with the students in their classes. A variety of devices was used: Tangrams, Geoboards, Pattern blocks, and Attribute blocks--as noted by the teachers, those very materials

that they "received at the January meeting". When enough sets were not available for the class, some teachers had the students make their own (e.g., Tangrams). And these manipulatives were used to "understand fractions", "introduce the concept of area and perimeter", "teach the concept of equivalence ", "challenge the children's 'logical' sense", "show how one geometrical shape is made up of different shapes", "introduce the concept of subsets", and "describe the properties of a square".

In discussing the responses of students, participating teachers made the following comments:

-"Those who were good in math generally did well with the Tangrams. There were a couple who usually did poorly in such things as 'x' and '-' who were the first to get the more difficult shapes (Raul, Lisa F.)."

-"Very positive--students cooperated and couldn't wait until it was their turn [there were not enough sets for each child]. Much better understanding of the concept of area and perimeter than from just the textbook alone. Kids loved the active participation and said 'it's better than a picture'".

-"A treat for them. Very positive interest. They specially enjoyed the puzzles".

-"The students were very interested and excited. Some very bright students could not do them. Other students were able to perceive the solutions".

-"Many kept returning to their initial [incorrect] solutions".

-"Some gave up very quickly".

-"They had some trouble trying to find the larger squares".

Several teachers indicated that there were "no problems" or "no special problems" from the point of view of what children learned, but others indicated problems of two types: the class time it takes to do a lesson using manipulatives and the fact that the project did not provide sets for all the children in the class. Thus, "It took a large chunk of time during class. We usually cannot afford to spend so much time on one activity". "The project did not provide enough materials for one per child". With respect to this point, one teacher said, "Our school refuses to give us funding for new textbooks, much less for equipment such as math supplies". Another indicated that, "If you had one set of manipulatives for every one or two children, it would be less time-consuming." Finally, one teacher summed up the issues by stating that, "The hands-on experience was worthwhile, as it gave the students a better understanding--a clearer understanding. I suggest you have one set per child and a large chunk of time to devote to the lesson. Since I'm not too familiar with manipulatives, I spent a lot of time preparing for this lesson. <u>It was worth it</u>!"

(Note that in addition to sharing their experiences with manipulatives, with a special emphasis on followup activities, the Study Group participants also covered a wide range of other topics. They talked about such things as working conditions in the NPS (discussing the advantages and disadvantages from the point of view of teaching personnel); their background training

and prior preparation in mathematics (like elementary level teachers in general, they not only were not specially prepared in mathematics--or in other subjects like science for that matter--but tend to experience a certain amount of math anxiety and dislike of the subject themselves); and teaching experiences in other countries (including for example, Latin America and South America, the Caribbean, and Ireland and some other European countries). They also discussed fractions, decimals, and percentages; word problems and problem-solving; probability; and long division.[1] They were interested in alternate ways to teach particular topics, the amount of class time available for review and practice, and the need to cover the curriculum in the allotted time.)

They were very excited about the project, but felt that they needed even more support--more workshops, additional small group meetings, and extra supplies and materials. These were their biggest criticism of the program. In terms of the Study Groups, 19 teachers rated the sessions in total, using the "Participating Teacher Rating Form" (see Appendix C.)

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[1] As a result of these discussions, Project Staff requested and received from the New York State Education Department, Bureau of Curriculum Development and Mathematics Education, copies of Probability in Elementary Schools: A Guide for Teachers, and Creative Problem-Solving to distribute to all participants. These resources, readily available to public school, teachers are not easily accessible to NPS teachers.

Overall, their assesment of the Study Groups (all meetings combined) was 4.6, above the mid-point between "above average" (4.0 on a 5-point scale) and "outstanding" (5.0). The reasons underlying these very high ratings stressed their practicality and usefulness, motivational and inspirational quality, and the knowledge, skill, and friendliness of both of the presenters: "The session brought math to life!"; "Good applications to teaching"; "I found the session very informative"; "It was presented in such a persuasive and knowledgeable way. So encouraging that we used the manipulatives [in class]. It was motivating!"; "Clear presentation"; "Application of methods to our practical teaching problems"; "Learned new techniques--helpful and practical"; "The sessions were comfortable"; "The information [I got] was interesting enough to want to share it with my colleagues and my class"; "Friendly"; "She treated all of us as individuals"; "Small group provided opportunities to communicate"; and, "She made clear many things I was confused about. I acquired new zeal to transfer my enthusiasm to my students".

All respondents liked the Study Groups because "the presenter was knowledgeable" and "covered the topic", "the vocabulary was appropriate", "the ideas presented were practical", and "it gave me new ideas and/or activities to try in my classroom". They also felt that "it motivated me to try some new techniques". Almost all of the people who responded to this

question on the Rating Form, 18 of the 19, also indicated that "some ideas I heard before were presented in new ways", "The presenter was interesting, well-prepared, and well-organized" and she "answered questions clearly and to the point". They also felt that the Study Group "made me feel more professional" (18), "more confident about the new math curriculum" (17), and provided "sound pedagogical techniques" and "additional teaching strategies that have special applications to the new math curriculum" (17). Eleven of the 19, 58 percent, also indicated that they had "an opportunity to network with colleagues from other schools"--the number probably an artifact of the small registration and not integral to the project design.

Several respondents offered "other" reasons for rating the Study Group highly, particularly emphasizing the fact that it "Was motivating and fun", "Great, but not enough. We would like more meetings and more materials", "Other workshops don't give us any new ideas! She presented many new and innovative ideas, practical enough for my classroom", "I learned many new methods to simplify math in the classroom", "She was very willing to answer questions", "...inspired me a lot. She made me realize that teaching mathematics is fun and it should be taught in that manner", and "She kept things moving and was interesting to listen to".

There were few suggestions for improving the Study Groups.

However, one person wanted more emphasis on "word problems", another would have liked more time devoted to percentages, and a third person indicated that she would have liked to discuss the use of calculators in the classroom. (In three of the Study Groups, a relatively great amount of time was devoted to hand-held calculators.) Several people indicated that they would have like the project better if "there had been more meetings".

Respondents to the Rating Form were able to list "two specific ideas, suggesions, or techniques" they learned as a result of the program, including the very specific, such as:

-the use of pattern blocks for teaching geometrical concepts;

-how to use Base-10 counters for teaching decimals;

-learning finger multiplication;

-the mimeographed Geobord sheet;

-introducing decimals by using Base 10;

-simplifying long division;

-using color counters to teach decimals;

-estimation as a way to teach division;

-filling in the missing digits "as a way to bring about better understanding";

-and, "techniques to find square roots quickly".

to the more general:

-application of manipulatives to different topics especially multiplication involving the concepts of area, probability, and fractions);

-"using manipulatives to motivate kids";

-doing math problems in groups;

-Learning how to verify answers;

-understanding that "the concept is what counts and manipulatives enforce it";

-using the calculator as "a tool for high level thinking"; and

-learning "not to be afraid to use to manipulatives in all lessons".

At the conclusion, respondents were asked to rate their own level of confidence in the use of manipulatives and to describe what they needed in order to increase their ease with these materials. The overall rating, all Study Group sessions combined, was 4.3--between 4.0, "somewhat confident", and 5.0, "very confident"--in marked contrast to their initial much lower feeling of confidence with these devices.

Finally, when asked to describe the "kinds of additional information or support you would need to work with manipulatives in your math lessons", participants in the Study Groups responded thusly:

-"I need to have time to have all my thoughts organized to use them more effectly [sic]."

-I need support with "the metric system."

-"Thanks a million. I don't need anything now."

-"Contact with leaders in the field."

-"More practice with them."

-"More workshops."

-"I think just practice and jumping in and actually 'doing' it".

In the following section of the report, we will present some conclusions and recommendations based on the information presented above and in the Evaluator's Report as well as on impressions and experiences we have had this year working with the nonpublic religiously-oriented elementary schools in New York City.

CONCLUSIONS

Sustantively, in the author's opinion, the "FOCUS ON THE ELEMENTARY SCHOOLS...." project, conducted by CASE during 1987-88, was very successful in meeting its goals, responding to the needs of the target teachers, and otherwise impacting positively on the participating schools. However, the project was somewhat less effective in overcoming all of the administrative challenges posed by the religiously-oriented school systems.

To begin with, an increased diversity of schools took part in the current year's project, including additional Greek Orthodox as well as Episcopal Schools. At the same time as the number of denominational school groups was expanded, and the number of schools increased, the focus on teachers was limited to those with responsibility for teaching mathematics to students in grades 4, 5, and 6. Most of the teachers we served this year were at these grade levels.

The planned activities, designed to serve these groups were developed for large- and small-staff development training formats, and were based on an assessment of the needs of the target teachers. The emphasis for 1987-88 was on the use of a variety of teacher-made and/or commercially-available manipulative devices that are applicable to teaching specific mathematical concepts and more general mathematical processes. A "teacher set" of these materials was specially packaged for this project and distributed to participants at all the meetings. Teachers used these manipulatives in the Workshop and Study Group sessions and, also, and of perhaps critical importance, in their schools and classrooms.

Participation in the project, as indicated by the number of teachers who came to the meetings, was less than expected. Attendance at the three Workshops held in January 1988 was generally high, encompassing approximately 70 percent of the teachers nominated as participants; attendance at the Study Groups was lower, attracting, over all the nine sessions combined, about one-quarter of the original target group.

The rate of participation, however, is not the sole determinant of the worth of the project. In this case, it seems to be a reflection of the nature of the schools and of several other fairly peripheral, but nevertheless recalcitrant factors.

First, it is important to note the project's positive outcomes: participants learned new techniques and mastered new mathematical concepts to a high level of confidence. Many changed their orientation and appreciation of mathematics to one that stressed math's creativity.

The second critical point to be noted is that they carried their new attitudes and skills back into the clsssroom. They worked hard at preparing new activities for their students and discovered that math can be fun, that it can engage here-to-fore uninvolved individual students and small groups, and that it permits the use of different approaches and solutions to problems.

Finally, participants also shared what they had learned with colleagues in their schools, both formally and informally. They conducted demonstrations for other teachers and took part in such things as writing articles for newsletters (See Appendix E.) The use of manipulative materials in these teachers' classrooms, during 1987-88 and for the future, are confirmed by their own reports and by the school principals. The added fact that participants called for more and longer meetings lends credence to this positive picture.

Problems remain--the level of attendance is an indication that project staff have not yet resolved all of the issues. Most

of the unresolved ones appear to be organizational, however, not substantive. One such question concerns how to individualize services and, at the same time, keep them cost effective. We believed we had achieved this balance in the original design for this years's project combining the workshop with the small-group study format. Based on the feedback from people who attended these meetings, including the participants, advisors, and the Evaluator, we still believe that these offerings serve not only to personalize staff development--and would be as effective even with more sizeable numbers--but also result in other gains: people from different denominational schools work together and learn from and share with one another; the teachers' different backgrounds (particularly, different levels of prior preparation in mathematics) can be individually addressed; and there exists the possiblility of people taking advantage of multiple training opportunities without significantly increasing program costs.

Another problem area is scheduling. This has already been discussed in detail. Relatively few options exist, specially during the Spring semester, for times during which all schools are open and teachers available to take part in special programs held off-site.

There then is a whole set of issues that relates to teachers' multiple commitments (to second jobs, families, formal training, and so on)--and that impacts negatively on attendance

at activities that take place (partly or wholly) after school.

Additional difficulties result from the fact that we are working with neighborhood schools selected to represent the geographic diversity of the schools within the various systems. Not only are the schools widely dispersed, which makes it unlikely that we can pair teachers together to travel, but the schools are often small as well--with, for example, only one teacher per grade--thereby making class coverage difficult. Relatedly, provisions for hiring substitute teachers in many of these systems is neither as easy or as defined as it appears to be within the public schools in the City.

The final concern relates to the question of "homework" for participants in voluntary staff development programs and whether such assignments affect, positively or negatively, such things as attendance and commitment. One of the consultants and the Evaluator both believed that the failure to complete the assignment given at the Workshops' conclusion was responsible for the decrease in attendance in the Spring. Indeed, there is some evidence that this could be the case: for example, only about one out of three teachers who came to a Study Group session completed the assignment formally--that is, in writing. On the other hand, the fact that two-thirds did <u>not</u> fill out Manipulative Activity Forms but came to a Study Group nevertheless, can also be interpreted to mean that completing the assignment did not

necessarily adversely affect one's intention to participate.

From a programmatic point of view, the purpose of the assignment was two-fold. First, staff anticipated that as a result of the Workshop, teachers would want to try out some manipulative-based activities with children in their classes. We intended to try to maximize these encounters for the teachers by structuring the experience: the result was a written "reminder"--the assignment itself--plus a form (the Manipulative Activity Form) for recording the interaction to capture similar relevant information.

As the "try-out-some-of-these-things-with-your-kids" assignment became more formalized, it became an integral part of the ongoing communications link we were establishing --a link that consisted largely of letters and telephone followups. (See Appendices B and D.) Viewed this way, "homework" may be seen as a connection, similar to other other types of connections described in the appended Evaluation Report (Appendix A)--especially when it is accompanied by phone numbers and names to call for help and advice.

At the end of both the 1986-87 and the 1987-88 project, the evaluation called for the creation of films and/or the use of audiovisual equipment as training vehicles for future participants. In 1988-89, videotape training of elementary level

teachers will be tried out in selected nonpublic schools in New York City. Six videotape segments (on such topics as alleviating math anxiety, using manipulative devices, and peer tutoring techniques) will be developed and pilot tested under two conditions simulating the more usual approaches to staff development. The Project Staff anticipates that not only will these tapes permit widespread dissemination of the project's focus on the middle elementary grades, but will also overcome such "distance learning" problems as school size and diverse geographic and scheduling configurations.

APPENDIX A

SUMMARY EVALUATION REPORT, 1987-88

Prepared by:
Mildred K. Lee, Ed. D.
June 1988

NONPUBLIC SCHOOLS MATHEMATICS PROJECT, 1987-1988

"FOCUS ON THE MIDDLE ELEMENTARY GRADES: A Continuation Project to Promote Quality Math Instruction in the Nonpublic Schools"

SUMMARY EVALUATION REPORT

I. INTRODUCTION AND PROGRAM OVERVIEW

CASE (Center for Advanced Study in Education), of the City University of New York Graduate Center, continued work to improve mathematics instruction in selected nonpublic religiously-oriented schools, during the school year 1987-1988, with funds from a third New York State Education grant.

During the first year of project operation (1985-1986), extensive staff development for teachers and administrators in grades 5-9 was provided through in-service mathematics courses, school visits, and seminars. The 1986-1987 year's program was a more limited staff development and training model, which provided the following services for selected teachers in the elementary grades:

- o information issues in mathematics;
- o alternate ways to teach particular topics in math;
- o classroom visits for teacher observation;
- o feedback on classroom visits, and/or
- o suggestions for locating or developing additional teaching-learning resources.

The current year's proposal, funded by the New York State Education Department's Bureau of Grants Administration and titled "FOCUS ON THE MIDDLE ELEMENTARY GRADES: A Continuation Project to Promote Quality Math Instruction in the Nonpublic Schools," was the single largest EESA Title II award granted. Despite the size of

the grant, it represented somewhat less than two-thirds of the original three-component proposal submitted for a comprehensive program directed at teachers in grades 4, 5, and 6; therefore, the scope of work as initially proposed was reduced by omitting the summer 1988 workshop component.

The 1987-1988 program as implemented consisted of two parts:

1. Fall 1987 large-group presentations, and
2. Spring 1988 small-group workshops

for the purpose of giving mathematics teachers in grades 4, 5, and 6 specific, "hands on," and practical experiences. Seventy-eight teachers from twenty-six schools participated during the 1987-1988 school year, drawn from seven nonpublic, religiously-oriented school systems, distributed in five New York City boroughs (Bronx, Brooklyn, Manhattan, Queens, and Staten Island) and one in Englewood, New Jersey as follows:

No. of Schools	Jurisdiction
6	Catholic Archdiocese of New York
6	Catholic Diocese of Brooklyn
8	Board of Jewish Education
2	Greek Orthodox Archdiocese
2	Agudath Israel of America
1	Episcopal Schools
1	Jewish Day School
26	

The purpose of this Summary Evaluation Report is to describe the process and procedures utilized to implement this project, and to assess the effectiveness with which goals and objectives were met during the 1987-1988 period of operation.

II. EVALUATION DESIGN

In designing this evaluation, summative and formative evaluation modalities were considered as appropriate programmatic interventions. It was recognized that summative evaluation's major purposes are to rate participants, judge consultant effectiveness, and compare curriculum content. Evaluation must take place at the termination of these processes, as well as "in process" while they are still malleable and amenable to change, adaptation, and modification. Formative evaluation data, therefore, meet all criteria for ongoing "in process" intervention.

Formative evaluation pinpoints areas of concern so that current and future training can be reflective, thereby becoming more relevant, pertinent, and beneficial. The primary purpose of formative observation is to determine how well a given learning task has been taught and to define the part of the task still to be mastered. In this way, the participant-learner and the trainer focus upon the specific learning necessary for approaches to mastery.

Summative evaluation usually serves to document the success or failure of a project; it often comes too late to influence the practices of the program as they are being evaluated.

A combination of formative and summative statements is included in this Report in order to reflect the effect of ongoing changes, adaptations, and modifications on participants' training needs and to assess project achievement.

This Evaluator gained historical and ongoing, current/first-hand perspectives of the program by engaging in activities which

included the following:

1. Perusing documents concerning the project;
2. Attending large-group and small-group presentations and workshops;
3. Consulting with Project Administrator;
4. Examining Evaluation Questionnaires, and
5. Conducting follow-up telephone interviews.

All of the above stated activities were undertaken to accomplish the following evaluation objectives:

1. ascertain the value perceived by participants of each of the program offerings in terms of the functions they perform;
2. obtain participant recommendations for changes in content, methodology, and format of each of the program offerings, and
3. evaluate change in participants' knowledge, job performance, and future plans as the result of training.

This evaluation report presents data distilled from primary and secondary sources - both formative and summative - from which a statement of program effectiveness will be made. Based on all the data examined, this Evaluator deems the project to be very effective; it responded to existing needs and exemplified significant positive features. These specific positive factors of the project's design and implementation are set forth in detail in later segments of this report.

III. METHODOLOGY AND FINDINGS

A. Documents Concerning the Project

Relevant documents related to this year's project were perused by this Evaluator to obtain both an historic view of program conceptualization, as well as an ongoing perspective of program implementation and progress.

Documents which were read included the following:

- Project Proposal;
- Advisory Committee Meeting Agenda (9/9/87);
- Advisory Committee Minutes (9/9/87);
- Letter to Principals (10/21/87);
- Participating Teacher Questionnaire (11/12/87);
- Letter to Teachers (11/13/87);
- Memorandum to Participants at the Thursday, January 21, 1988 Workshop for Grade 4 (and other) Teachers from the Nonpublic Schools (1/26/88);
- Memorandum re Spring Workshops to Participating Teachers, Nonpublic School Math Project (2/16/88);
- Memorandum and Manipulatives Activity Form to Teachers who took part in the January Workshop Program, Manipulatives in Mathematics (3/10/88), and
- Memorandum to Teachers re Spring Study Group Sessions (3/10/88).

Copies of documents listed above (other than the Project Proposal) appear in Appendix A.

From the documents perused, individually and collectively, this Evaluator gained a sense of organizational unity, consistency of purpose, and fidelity to program goals and objectives. These documents formed a cohesive and sequential entity, which moved developmentally from one phase of the program to another.

In addition to describing the project's goals, content, and format, these documents indicated that this year's implementation represented its third and final one. It was indicative of the Project Director's foresight that the Advisory Committee's 9/7/87 discussion included the issue of new project ideas.

B. Participating Teacher Questionnaire

A survey questionnaire was sent to participating teachers prior to the project's beginning for the purpose of obtaining demographic data, as well as to get information for use in planning January workshop meetings.

Based on responses to the questionnaire, the program's Technical Assistant prepared an analysis, which served as a needs assessment and, therefore, became a blueprint for selection of workshop topics and teaching strategies. Copy of the questionnaire analysis appears in Appendix B.

Two significant findings emerged from the questionnaire analysis:

1. Teachers of grades 4, 5, and 6 rated their competence with each of seven manipulative materials as well below average.

2. In addition to needs for training about manipulatives, teachers indicated interest in new materials and technologies.

The precise and comprehensive questionnaire analysis presented in Appendix B is another indicator that program staff were attentive to participants' needs and made efforts to respond programmatically to their concerns.

C. Manipulative Activity Form

Teachers who took part in the January workshops titled "Manipulatives in Mathematics" were requested to

> "develop or try out three exercises - using one or more types of manipulative material - and briefly write up what you did, how the students responded, and how you reacted to the lesson, noting particularly any recommendations or suggestions you would make to teachers like yourself." (Memo 3/10/88, Appendix A)

The Manipulative Activity Form was to be used for reporting. Seven teachers responded in writing by describing what they had taken from the workshop experience into the classroom. Two reports (name and school deleted; other deletions made by teacher submitting form) were selected at random; copies appear on pages 8, 9, and 10 following. Both activity forms indicate resourceful, practical, and innovative use of workshop concepts into classroom teaching.

The number of teachers who responded to the Manipulative Activity Form was low, when measured against the enthusiasm and active participation observed in the January Workshops. It can be speculated that teachers who may be on a "high" from a positive staff development experience away from school must return to their custom ary routines and daily demands. Even if more than seven teachers "tried out" workshop concepts, they might have found setting the experience down on paper difficult, time consuming, and/or without personal reward (e.g. immediate feedback, consultation,

Center for Advanced Study in Education
Graduate School and University Center
The City University of New York

MANIPULATIVE ACTIVITY FORM
Nonpublic School Mathematics Project

Type of Manipulative (State name, describe activity, specify if commercially produced or made by teacher/students.)
Geoboard, using colored rubberbands to form squares and rectangles of various units using the geoboard which was issued at the last meeting.

The Activity (Describe the assignment for students, highlighting the points enumerated below.)
In a group of 4, students each had a turn to try a different activity on the geoboard, such as constructing squares of 1 square unit, 2 -

1. Objective (State the major purpose of the exercise--e.g., "to introduce the concept of area.")
To introduce the concept of area and perimeter.

2. Grade level of students/Type of grouping (E.g., fifth graders in groups of three--one set of manipulatives for every group.)
4th graders in groups of 4, plus the teacher. One set of manipulatives for the entire group. Meanwhile, the remainder of the class worked on independent work.

3. Students' responses (Note the level of interest, the observable impact on learning, and pertinent comments and reactions of students.)
very positive - students cooperated and couldn't wait until it was their turn. Much better understanding of the concept of area & perimeter than from just the textbook alone. Kids loved the active participation

4. Special Problems (include here any special problems, such as noise level, difficulty in handling small pieces, etc.)
It took a large chunk of time during class. We usually cannot afford to spend so much time on one activity.
I started the first group on constructing triangles, but had to dismiss [redacted]

Conclusions and Recommendations (State the outcomes of the activity, your conclusions about its worthwhileness, and your suggestions and recommendations for other teachers.)
The hands on experience was worthwhile, as it gave the students a better understanding of area - a clearer understanding. I suggest that you have one geoboard per child and a large chunk of time to devote to the lesson. Since I'm not too familiar with manipulatives, I spent a lot of time preparing for this lesson. It was worth it!

Optional
Name: [redacted]
School: [redacted]

Use the reverse side of this page if you need more space.

square units, 3, etc. Also to construct rectangles of 3 square units, 6 etc.

- To construct a rectangle and a square so that they both have the same number of squares inside. We discussed perimeter as it relates to this. (which has the smallest perimeter?)

- To form a set of squares, starting at the lower left corner of the geoboard of 1, 4, 9, 16 square units. How many squares to go from the first to second, second to third, etc. Discussed if there is a pattern.

---

(3) [redacted]

One child [redacted] said, "It's better than a picture!" Most of the students are busy at it, and it seemed as if they enjoyed the challenge of doing "hands on" and the problem solving.

Using manipulatives was a treat to them.

Center for Advanced Study in Education
Graduate School and University Center
The City University of New York

MANIPULATIVE ACTIVITY FORM
Nonpublic School Mathematics Project

Type of Manipulative (State name, describe activity, specify if commercially produced or made by teacher/students.)
attribute block (color and shape
- commercially made -

The Activity (Describe the assignment for students, highlighting the points enumerated below.) Ask the student to place a yellow round one on a line. Then place all those other the first loop to make the many sets that

1. Objective (State the major purpose of the exercise--e.g., "to introduce the concept of area.")
To introduce the concept of subset.

2. Grade level of students/Type of grouping (E.g., fifth graders in groups of three--one set of manipulatives for every group.)
one set of manipulatives for each fourth grader.

3. Students' responses (Note the level of interest, the observable impact on learning, and pertinent comments and reactions of students.)
There are 4 different ways the second loop may be placed within the first loop. Each set within the original set is called a subset.

4. Special Problems (include here any special problems, such as noise level, difficulty in handling small pieces, etc.)
There was no specific problem.

Conclusions and Recommendations (State the outcomes of the activity, your conclusions about its worthwhileness, and your suggestions and recommendations for other teachers.)
For a follow-up activity other sets with different numbers may be used. The results may be placed on a chart.

Optional
Name: [redacted]
School: [redacted]

Use the reverse side of this page if you need more space.

network sharing).

Whenever "homework" assignments are built into the staff development training experience, program administrators might consider ways to attach personal/professional rewards for respondents in the form of immediate written feedback or telephone follow-up. In addition, the workshop "high" might be preserved and lengthened by regular and ongoing contacts with participants (e.g. reunion, networking chain, "hot" line telephone communication, suggestion box inquiry, newsletter).

D. Project Meetings

The 1987-1988 project consisted of three large-group meetings (one each for teachers of grades 4, 5, and 6) held in January 1988, plus nine smaller study-group meetings for these same teachers in the Spring of 1988.

1. January 1988 Workshops

1.1 Workshops were held for teachers by grade level as follows:

Date	Level	Topic	Presenter
1/19/88	6	Using Manipulatives: Theory, Practice, and Reinforcement in the Classroom	Dr. Sandra Clarkson
1/21/88	4	Uses of Manipulatives in the Classroom- Understanding the Why's	Dr. Susan Turkel
1/26/88	5	Manipulatives and the Teaching of Mathematics - Motivating Learning	Dr. Clarkson

Copies of the announcement/reservation form for each of the workshops appear in Appendix C.

1.2 This Consultant attended two of the three workshops - one conducted by Dr. Clarkson, the other presented by Dr. Turkel. Both presenters encouraged active participation by getting teachers involved in "hands on" experiences with manipulatives. In addition to the experiential aspect for teachers, both leaders emphasized the use of manipulatives in classrooms to facilitate students' understanding and knowledge of mathematical concepts. Excellent resource materials, including samples of manipulatives, were given to teachers at each workshop. Copies of sample resource materials distributed

appear in Appendix D.

Participants at all three workshops were requested to complete a rating form at the conclusion of the session.

1.3 Fifty-two of fifty-three workshop attendees filled out rating form. Results obtained from analyzing these rating forms were as follows:

MATHEMATICS CENTER, NONPUBLIC SCHOOLS
PARTICIPATING TEACHER RATING FORM

Workshop 1,2,3 — Date: 1/19, 1/21, 1/26/88 — Grade: 6 = 1/19 N=15; 4 = 1/21 N=24; 5= 1/26 N=13

Your candid and complete responses to the Evaluation Information below will help us to judge the value of today's Workshop presentation, resource materials, and interaction.

I. I LIKED THIS WORKSHOP BECAUSE... (Check all that apply.)	No. of Responses
1. I received new information.	51
2. some ideas I heard before were presented in new ways.	38
3. the presenters were knowledgeable.	50
4. the presenters were interesting.	50
5. the presenters covered the topic.	48
6. the ideas presented were practical.	45
7. it gave me new ideas/activities to try in my classroom.	48
8. it motivated me to try new techniques.	50
9. the presentations were clear.	49
10. I received useful resource materials.	47
11. the presentations were grade-level consistent.	46
12. the presentations were sequential and developmental.	43
13. the presenters were well prepared.	52
14. the presentations were well paced.	43
15. the presenters used sound pedagogical techniques.	44
16. the presenters used appropriate vocabulary.	48
17. the presenters made enlightening clarifications.	38
18. I had opportunities to network with colleagues.	24
19. I learned additional teaching strategies that have special applications to the new math curriculum.	42
20. it made me feel more confident about the new math curriculum.	35
21. it made me feel more professional.	32
22. Other (Be specific, please!)	

"This will allow my students to enjoy learning through doing..."
"terrific workshop" "practical and helpful" "excellent"
"Most practical and informative. It made me want to try using them."
"very interesting way to present many math topics. I'm planning to try them very soon."

II. I WOULD HAVE LIKED THIS WORKSHOP BETTER IF... (Please fill in.)

1. more information had been provided on
   "multiplication and long division" "algebra"
   "using manipulatives in other areas besides geometric concepts, e.g. fractions" "problem solving and calculator usage"
   "actual everyday teaching" "more resource materials"

2. (IF) it met my needs for
   "teaching long division to slow learners" "ways to improvise"

3. (IF) it met my students' needs for
   "fractions" "help with theoretical math"

4. Other
   "sentence and word problems" "more time... I felt over stimulated."

III. OVERALL ASSESSMENT

1. Please circle a number below to indicate your overall assessment of this Workshop:

Rating	No. who circled	Weight
(1= POOR)	0	0
(2= BELOW AVERAGE)	0	0
(3= AVERAGE)	2	6
(4= ABOVE AVERAGE)	30	120
(5= OUTSTANDING)	20	100
Totals	52	226

Weighted Average = 4.4

2. Briefly specify the reasons or factors underlying your overall assessment.

"We should have more of these so math becomes more interesting and less scary. It made me feel math could be fun."

"...I learned practical ideas for classroom use."

"All presenters (speakers) were friendly!"

"The workshop was enlightening."

"It was interesting except that I felt rushed through several activities."

"New information and techniques presented in a simplified way."

"I felt comfortable. I learned a lot of new things.

"Did not help me use new things on a day-to-day basis."

"Both teaching aid and methodology in presentation of concepts were so outstandingly good."

"usefulness of information given"

"gave me chance to be a student"

"workshop well organized...covered large amount of information in short period"

"using concrete examples before abstract materials motivates pupils better... introducing manipulatives gives me a better idea of introducing concepts."

"made me less wary of using manipulatives on an upper level"

"materials seem very useful but expensive if purchase required."

"Practical, inexpensive, creative!"

"It introduced me to some materials I would not have known how to use."

"Simple ideas were used in order to make manipulatives more approachable in the classroom, especially for teachers."

Comment

For purposes of analysis, the questionnaire responses for all three workshops were considered together.

Based on statement I (I Liked this Workshop because...), it can be concluded that respondents were more than satisfied in 16 of 21 categories, where a range of 81%-100% of participants checked their approval.

When respondents gave the workshop an overall assessment (III, 1), it was consistent (4.4 = Above Average - Outstanding) with the tenor of statement I items checked.

Respondents noted professional issues and concerns, as well as highly positive reactions to workshop content, format, presentation, and resource materials in response to statement II (I would have liked this Workshop better if...) and overall assessment (III, 2).

2. Spring 1988 Meetings: Small Study Groups

2.1 A total of nineteen teachers attended the nine Spring Workshops scheduled as small study groups in a variety of locations to increase accessibility. Study groups took place from April 18 through May 5 by grade level. These groups for each grade level (4, 5, 6) were held in three locations, one each in Manhattan, Queens, and Brooklyn.

This Consultant attended a study group conducted by Dr. Clarkson at CUNY Graduate Center for grade 5 teachers. Four teachers were present for Dr. Clarkson's introductory remarks, and, then, they participated in a discussion of current math issues, as well as in sharing ways they had used manipulatives in the classroom.

As usual, Dr. Clarkson was knowledgeable, creative, sensitive, and responsive to individual and group needs. Discussion centered around ways teachers had implemented what had been learned in the January Workshops. Teachers brought up substantive issues concerning problems with older students in the upper grades, who view using manipulatives as "baby stuff." Brainstorming, led by Dr. Clarkson, generated many useful ways to involve older students (e.g. using in problem solving, setting up estimating and probability problems, building geometric skills, practicing critical thinking, and working on challenge material.

Throughout the study-group session, participation was lively and enthusiastic. In summary, Dr. Clarkson restated the overall purposes for the use of manipulatives in the classroom as ways:

- to make math more meaningful to students, and
- to redefine basic skills in math to include measurement, estimation, geometry, analysis in addition to math processes of addition, subtraction, multiplication, and division.

2.2 Teachers who attended the Spring Study Groups were requested to assess the presentation, resource materials, and interaction on a Participating Teacher Rating Form. Summary data are presented below and on the following page.

MATHEMATICS CENTER, NONPUBLIC SCHOOLS
Participating Teacher Rating Form
Center for Advanced Study in Education
The Graduate School and University Center, The City University of New York

Study Session No. 1-9
Date ALL SESSIONS
N = 19

Your candid and complete responses to the information below will help us to evaluate the value of today's presentation, resource materials, and interaction.

I. I LIKED THIS SESSION BECAUSE... (Check all that apply.)

18 I received new information
18 some ideas I heard before were presented in new ways
19 the presenter was knowledgeable
18 the presenter was interesting
19 the presenter covered the topic
14 the ideas presented were practical
19 it gave me new ideas and/or activities to try in my classroom
19 it motivated me to try some new techniques
19 the presentation was clear
18 the presenter was well prepared
18 the presentation was well paced
17 the presenter used sound pedagogical techniques
19 the presenter's vocabulary was appropriate
18 the presenter answered questions clearly and to the point
11 I had an opportunity to network with colleagues from other schools
17 I learned additional teaching strategies that have special applications to the new mathematics curriculum
17 it made me feel more confident about the new math curriculum
18 it made me feel more professional
9 other (be specific, please) _____

"would like more workshops and materials - motivating and fun"

"got new ideas from presenter"

"new methods for simplifying math in the classroom"

"many innovative ideas, practical enough for my classroom"

"presenter very willing to answer questions"

"presenter inspired me"

"made me realize that math is fun... should be taught that way"

"excellent"

"some ideas made me think"

II. OVERALL ASSESSMENT

Please circle a number below to indicate your overall assessment of this Session:

Rating	No. who circled	Weight
(1= POOR)	0	0
(2= BELOW AVERAGE)	0	0
(3= AVERAGE)	0	0
(4= ABOVE AVERAGE)	8	32
(5= OUTSTANDING)	11	55
Total	19	87

Weighted Average = 4.6

Briefly specify the reason or factors underlying your overall assessment.

"brought math to life...informative, encouraging; presenter knowledgeable, motivating; clear presentation; applications to teaching"

"gained new skills in teaching manipulatives"

"comfortable with workshop"

"Her eagerness to share what she knows is very genuine and it encouraged me to teach my subjects with more interesting techniques."

"The use of manipulatives is a very effective strategy in teaching math concepts."

"interesting enough to want to share with my colleagues"

III. I WOULD HAVE LIKED THIS SESSION BETTER IF... (Please fill in.)

Very few respondents wrote anything in this section. Two comments related to having more time for workshops. One comment referred to applying manipulatives to decimals.

IV. Please briefly describe two specific ideas, suggestions, or techniques you learned as a result of this program.

"using pattern blocks for geometry"
"using base-ten counters for decimals"
"application of manipulatives to different areas"
"ways to motivate kids"
"doing math problems in groups - consensus"
"verifying answers"
"using materials for probability"
"mimeographed geoboard sheet"
"use of finger multiplication"
"geoboards for finding area"
"new ways to use calculators"
"fractions"

V. How confident do you now feel about introducing the use of manipulatives into a math lesson for the children in your class? (Circle one number.)

Rating	No. who circled	Weight
(1= Not confident at all)	0	0
(2= Not very confident)	0	0
(3= Neither confident nor not confident)	1	3
(4= Somewhat confident)	11	44
(5= Very confident)	7	35
Total	19	82

Weighted Average = 4.3

Please describe what kind of additional information or support you would need to work with manipulatives in your math lessons:

"I'd like more practice with them."

"longer workshops"

"more hands on instruction for myself"

"I need to have all my ideas organized to use them more effectively."

"the metric system"

"more manipulatives"

"more contact with leaders in the field."

Comment

Findings from the Spring Study Group assessment sheets confirm positive perceptions and ratings obtained and described for the January Workshops. Respondents were highly positive - often laudatory - about the value of the small-group study sessions as vehicles for personal/professional growth, exchange of ideas, interaction with peers, and group problem solving.

The fact that only 19 teachers attended these well organized and expertly presented small-group study sessions raises speculative issues about causes for the low attendance, when compared to January Workshop participation (N= 53).

In order to gain insights about the fall off in attendance, as well as to gather additional impact information, follow-up telephone interviews were conducted. Findings concerning these telephone interviews with school principals are set forth in the following section of this Report.

E. Follow-up Telephone Interviews

A sample of principals from participating schools was selected randomly for follow-up through telephone interviews.

In prior years, teachers who participated in workshops and seminars were selected at random for this followup process. Trying to contact teachers, during their school day, proved less than satisfactory, in the past, because they are usually available only at lunch, preparation, or administrative assignment periods, and, thus, seemed harried and pressed for time. Also, if several teachers from the same school were participants, making the follow-up call to only one did not yield a gestalt of that school's experience.

It was decided, therefore, that principals might be better information sources for this follow-up procedure.

Three questions were asked of the five principals who were interviewed by telephone:

- o How would you comment on the "hands on" approach to manipulatives used during workshops as a learning strategy for your teachers?

- o How would you rate the overall value of the 1987-1988 program concept and implementation to teachers? (5-point scale where "1" = Poor and "5"= Outstanding)

3. What impact have participating teachers made on this year's school program, and what plans do you have for 1988-1989 to use workshop content and/or resources?

The results of the interviews were as follows:

Principal #1 (3 participating teachers - 2 at both sessions; 1 at one session, January workshop)

Question #1 - "excellent idea, teachers obtained concrete examples of use of manipulatives for all kinds of students...good way for teachers to get ideas about relationships between volume and

perimeter... more resource materials needed in sets so that students can work in small groups"

Question #2 - "overall value to participating teachers is '5', because of the excellent idea which should be promoted through all curriculum - children learn best by being able to do, to guess concretely before doing and learning the abstract"

Question #3 - "next year 2 participating teachers will conduct faculty workshops (9/88) on math, using what was learned to apply manipulatives in math and science, as well as problem solving" "participating teachers have shared already this year to clarify use of manipulatives for use in probability problems, logic, working with remedial students and with the gifted... I recommend the broadest dissemination because textbooks aren't enough - they don't sink in without 'hands on' experiences"

Principal #1 indicated that the teacher who had not returned for the small-study groups in the Spring had been coping with personal and family problems related to illness.

Principal #2 (4 participating teachers, all attended both sessions)

Question #1 - "math is my field... I'm very enthusiastic about what the program did for my teachers... teachers came back all fired up to do things better and to make math more fun, more creative, more relevant... I hold office with the math council, so I'm sold on the value of this type of staff development and training"

Question #2 - "I'd give it a '5', truly outstanding."

Question #3 - "As soon as they came back, they shared what they had experienced with faculty here in regular conference time.

They're all making classroom use of what they learned. For the Fall semester, a diocesan newletter article will appear as a dissemination procedure. In addition, diocesan workshops are planned."

Principal #3 (3 participating teachers, attended January Workshop only)

Question #1 - "Teachers liked the 'hands on' approach; however, since they found the first workshop only moderately valuable to them they did not return... Teachers said the workshop was not advanced enough for them, because they've attended other workshops which covered some of the same material."

Question #2 - "I would give an average rating."

Question #3 - "Teachers who attended the first workshop disseminated information at weekly math meetings... manipulatives will be used in classrooms during 1988-1989."

Principal #4 (4 participating teachers; 2 attended both sessions; 2 attended January session only)

Question #1 - "Teachers who attended were enthusiastic and glad to see that concrete, hands-on experiences were used as workshop strategies. Our problem is that materials needed for this approach are not available in this school. The concept is an excellent one, which I endorse."

Question #2 - "It's the best way to teach. I'd give it a '5' for excellent."

Question #3 - "When teachers came back from the January conference, they shared formally and informally with the faculty. There are no immediate plans for these teachers to do more next semester."

Principal #4 indicated that the two teachers who had not returned in the Spring for the small-group study sessions had cited travel problems and home commitments which required them to be back in their neighborhoods by 4 p.m.

Principal #5 (2 participating teachers; 1 teacher attended both sessions, the other attended January session only)

Question #1 - "very good... teacher who attended both sessions most enthusiastic... what was done was needed and practical"

Question #2 - "a rating of 4+ for the overall concept"

Question #3 - "teacher who attended both sessions gave workshop to others on the grade...requirement for dissemination should be built into the program, a mandate based on shared school time... more time needed for the program which must continue"

Principal #5 indicated that, although both teachers wanted to attend both sessions, she was unable to find coverage for more than one. She cited scheduling problems as frequent obstacles to ongoing staff development and training.

Comment

Four of the five principals chosen randomly for telephone follow-up interviews were impressed with the quality of the math program and its effect on their teachers. All of the principals had involved teachers in some form of dissemination to share program ideas with other faculty members. One principal felt

that some form of dissemination should be mandated by program administrators. Statements elicited from principals corroborated ratings and comments from other sources that the program was effective and valuable to teachers.

In a preceding section of this Report (D,2), the issue of attendance fall off between the January Workshops (N= 53) and the Spring Small-Group Study Sessions (N= 19) was raised. As the result of follow-up telephone interviews with principals, the following reasons can be cited for low attendance at the small-group meetings:

- o personal/family illness;
- o more advanced content needed because teachers were involved in previous workshops;
- o travel difficulties;
- o home responsibilities requiring presence back in residence by 4 p.m., and
- o administrative problems related to teacher coverage and scheduling.

Although the subject of "homework" was never mentioned as a deterrent to small-group attendance, some consideration must be given to this factor. Consultants assigned specific projects for teachers to complete; few of the teachers (7) responded to this requirement. One principal, who was not part of the random sample interviewed, stated that teachers did not want to come back because "they thought they'd be told how to do it and not have to do it themselves."

IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This Evaluation Report proposed to describe the process and procedures used to implement this project and to assess the effectiveness with which goals and objectives were achieved during the 1987-1988 period of operation.

In order to accomplish these evaluation purposes, data were generated and compiled to assess the quality of the program in terms of overall functioning. In addition, specific programmatic aspects of the program were measured to determine their value to participants.

Based on the analysis and interpretation of data, both formative and summative, from all primary and secondary sources, it should be concluded that this project was exemplary primarily because it responded to perceived needs and manifested significant positive characteristics.

Examples of specific positive features of this project's design, implementation, and operationalization are set forth in the summary and concluding statements which follow:

- o This project responded to perceived needs of teachers and administrators in the 26 selected schools.
- o The vehicle chosen for this accomplishment of project goals and objectives was staff development and training, long recognized as an apt service delivery system to "on-the-job" personnel.
- o Staff development and training consisted of two parts - January Workshops and Spring Small-Group Study Sessions - which diversified project offerings in order to meet the needs of a heterogeneous population more effectively.

- The Project Director provided creative leadership which resulted in a well planned and organized operation.

- Consultants were uniformly knowledgeable and expert in the field of mathematics and with the use of manipulatives. In addition, they were sensitive and empathic large- and small-group leaders.

- The project continued to foster and cement relationships established during the 1985-1987 years of project operation with school personnel in religiously-oriented schools.

- Feedback from project "users" was obtained and utilized in an ongoing way for planning future sessions, making changes and modifications, and preparing for future replication and/or expansion.

- Feedback solicited from principals and teachers through checklists, numeric ratings, open-ended statements, and telephone follow-up interviews consistently described the project's offerings as "above average" or "outstanding."

- Feedback mechanisms had "built in" needs assessment questions. Replies to these questions gave enthusiastic support to continued services with more options and more time for project interventions.

- Project offerings responded to individual differences in learning styles by including a diversity of teaching approaches.

- Participants received and/or used excellent resource materials.

- Participants received cognitive and affective experiences. Sessions included didactic and experiential aspects, with exmphasis on "hands on" techniques.

These summary and concluding statements are evidence of positive characteristics attributable to the project's design and implementation by competent and capable personnel.

Recommendations made are culled from all evaluative data related to the project, as well as from personal observation, analysis, and interpretation. Based on an overview of the project, the following recommendations are made:

1. The project's goal of improving the quality of mathematics instruction in nonpublic, religiously-oriented schools is an appropriate one, which should be pursued during the 1988-1989 school year.

2. Suggestions offered by respondents during the current and prior years of project operation should be reviewed carefully and adopted if feasible, in order to make future program offerings even more effective. Particular attention should be given to those suggestions which request:

- more time per session;
- more sessions;
- continued differentiation by grade level, and
- more individualization for participants in need of advanced training.

3. The content, materials, process, and procedures used by this project during the 1987-1988 period of operation should be codified to facilitate replication.

4. The use of audio and audio/visual equipment should be considered as a training vehicle, as well as to develop training films for future participants.

5. Follow-up activities should be conducted with 1987-1988 participants to measure more fully the project's impact and influence on job performance.

6. Administrators should consider inclusion of a program-participation mandate requiring participants to elect some form of dissemination modality.

7. "Homework" assignments should be tied to some immediate personal/professional rewards, such as telephone feedback, networking chain, newsletter, or school-based group activity.

APPENDIX A

DOCUMENTS CONCERNING THE PROJECT

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center, 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

October 21, 1987

CASE (the Center for Advanced Study in Education), of The City University of New York's Graduate School, has received another grant to work with the nonpublic schools in New York City in promoting quality mathematics instruction in grades 4, 5, and 6. Funding for the activities comes from the New York State Education Department, under Title II of the EESA.

Your school was one of 26 identified as being interested in this project and, when you spoke with Sister Rita Nowatzki of the Catholic Archdiocese of New York, you confirmed your interest in taking part in it. Now I would like to bring you up to date about the plans for the 1987-88 school year.

For those schools that participated before, this is the third year of the project, but the first time the focus has been strictly narrowed to teachers in grades 4, 5, and 6 who have responsibility for teaching mathematics. The reason for this is not only are these the critical grades in terms of the development of children's math-related attitudes and skills, but they are also the grades during which mathematics changes from the more intuitive to the more cognitive-based.

Since you have already provided us with the names of these teachers I will be writing to them directly in the next couple of weeks to get their opinions about important issues and to tell them about the upcoming activities.

The plans are for three mathematics workshops for this winter: one for the grade 4 teachers from the 26 schools, one for the fifth grade teachers, and the third workshop for the grade 6 teachers with responsibility for teaching mathematics. Each workshop will be scheduled from about 1:30 to 4:30 p.m. Although all teachers (that is, <u>all</u> but <u>only</u> grade 4, 5, and 6 teachers) are welcome at all three workshops, the intent of each one is to deal with those mathematical issues that are particularly germane to that grade (recognizing, of course, that there is a great amount of overlap). Experts in elementary school mathematics and math education will direct these workshops which will be held at The City University of New York Graduate School in mid-Manhattan (opposite the New York Public Library). The teacher participants will work on problems they said they were encountering in the classroom, using

materials and other resources that we will provide.

I will get back to you and to the concerned teachers with the exact dates of these three workshops as soon as they are confirmed.

Small group followup meetings for teachers from the targeted grades are being planned for the Spring term. Again, we will be holding separate sessions for grade 4, 5, and 6 teachers at locations closer to your school. For example, for each grade level we will schedule a meeting for Manhattan and Bronx teachers, one for Queens teachers, and one for Brooklyn and Staten Island teachers from each grade (for a total of 9 small group meetings). We expect each teacher from your school to attend one such meeting, although she/he is welcome to come to all three meetings in the different locations for that grade. (In fact, he/she would be welcome at all 9 meetings--or at any number and combination.) The purpose of these meetings is for teachers to share the outcomes of their experiences with the particular problems they chose to work on with their students at the workshop.

We will continue to keep you and your staff informed of the plans for these small-group meetings.

I will call you within the next two weeks with definite dates for the three winter workshops and with a progress report on the other activities. If you have any questions about the project before I telephone, please call me (or Jeffrey Miller, the Project Assistant) at 212/575-1493.

I look forward to working with you.

Sincerely yours,

Barbara R. Heller
Project Director

cc: Advisory Committee members
Dr. Mildred K. Lee
Dr. Susan Turkel
Dr. Sandra Clarkson

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

November 13, 1987

Dear Colleague:

Your principal has nominated you and other teachers from your school to take part in our project to promote quality mathematics instruction in grades 4, 5, and 6 in selected nonpublic schools in New York City.

I'd like to tell you some things about the project as well as a little about myself and my organization, and also ask you to complete a short questionnaire (only six questions) that will help us plan the details of the upcoming workshop meetings.

My organization, CASE--the Center for Advanced Study in Education of The City University of New York's Graduate Center--designs educational programs that respond to the needs of children in the public and nonpublic schools as well as the needs of teachers and administrators. As a senior CASE project director, I have been concentrating on mathematics for the last 10 years. Since 1985, I have been conducting a staff development project for teachers from schools affiliated with the Roman Catholic, Jewish, Greek Orthodox, and Episcopal religions.

This year's project involves teachers in grades 4, 5, and 6--grades we believe are critical to the formation of positive attitudes, good skills, and a cognitive approach to mathematics. We plan to work with teachers from one grade at a time, although all the teachers in the project are eligible to come to all the meetings.

For the first phase, we will be holding three workshops in January 1988, one each for teachers of grades 4, 5, and 6. Each workshop is scheduled from 1:00-4:30 p.m.:

- Grade 4 teachers will meet on Thursday, January 21
- Grade 5 teachers will meet on Tuesday, January 26
- Grade 6 teachers will meet on Tuesday, January 19.

Although I will be sending you a reminder invitation and workshop agenda, please make a note of the date of the meeting(s) you will be attending. Also note the we will be offering refreshments--coffee and tea and desserts.

All three workshops will be held at the City University Graduate Center in mid-Manhattan, opposite the New York Public Library. Some of you have attended our workshops before and know that we are very accessible to all forms of public transportation--including parking, although parking in the neighborhood is very expensive.

Each workshop will emphasize a particular topic in the elementary school mathematics curriculum and will be led by an expert in elementary math education. We will provide you with materials, resource kits, and lists of suggested readings. To plan the content of the workshop and the materials, we need to have your feedback. Please complete the questionnaire included with this letter, and return it to me as soon as possible. Feel free to call me with any questions you have about the program or about the enclosed survey.

In the Spring, probably in March-May, we will be offering followup sessions at locations more convenient to your school. There will be three meetings for grade 4 teachers, three for grade 5 teachers, and three of these study sessions for grade 6 teachers. You are expected to attend at least one session for your grade, although you may come to all three and/or one or all of the sessions for the other two grade levels. I'll keep you up-to-date about the plans for the Spring as they develop.

For now, please fill out and return the questionnaire and mark your calendar for the January workshop(s).

We are looking forward to working with you and feel quite confident in anticipating that you will find that taking part in this project is both enjoyable and rewarding.

Sincerely yours,

Barbara R. Heller

Barbara R. Heller
Project Director

cc: Advisory Committee representatives
Principals of the participating schools
Dr. Susan Turkel
Dr. Sandra Clarkson
✓Dr. Mildred K. Lee

Center for Advanced Study in Education
The Graduate School and University Center
The City University of New York

Advisory Committee Meeting

MATHEMATICS INSTRUCTION IN NEW YORK CITY'S NONPUBLIC SCHOOLS, 1987-88

September 9, 1987, 10:00 a.m
CUNY Graduate School, Rm. 300N

AGENDA

1. Overview of last year's (1986-87) project:
   - Accomplishments
   - Results and recommendations
   - Advisors' feedback

2. Current project (1987-88 school year):
   - Objectives
   - Selection of schools (20 "old" & 6 "new" schools including one school from each of the following groups: Episcopalians, Lutherans, Mormons, Seventh-Day Adventists):
     Schools' responsibility to project
   - Selection of technical consultants
   - Fall large-group meetings (at Graduate Center) for teachers of grades 4, 5, 6:
     Scheduling
     Opening meeting to other schools
   - Spring study groups:
     3 for each of grades 4, 5, and 6
     In 3 locations: Manhattan and the Bronx; Queens; Brooklyn and Staten Island
   - Advisors' suggestions for scheduling, site selection, and limiting participation

3. Additional Advisory Committee meetings

4. Publicizing the Project (articles in newletters, special announcements, and so on)

Advisory Committee Representatives: Mr. Morton Avigdor, Agudath Israel of America; Mr. Benjamin Miller, Board of Jewish Education; Sister Rita Nowatzki, Catholic Archdiocese of New York; Ms. May Santos, Catholic Diocese of Brooklyn; Dr. Andreas Zachariou, Greek Orthodox Archdiocese; Dean Seymour P. Lachman, University Dean for Community Development (ex officio); Dr. Bert Flugman, CASE (ex officio); Professor Barbara R. Heller, Project Director; Dr. Jeffrey Miller, Project Associate; Dr. Mildred K. Lee, Evaluation Consultant (ex officio).

* List of 1986-87 schools attached

MATHEMATICS INSTRUCTION IN NEW YORK CITY'S NONPUBLIC SCHOOLS

Participating Schools, 1986-87

Agudath Israel of America
- Bais Yaaov Academy of Queens--Queens
- Yeshiva and Mesivta Ohr Yisroel--Queens

Board of Jewish Education
- Bialik School--Brooklyn
- Crown Heights Yeshiva--Brooklyn
- Mizrachi L'Banim--Brooklyn
- Prospect Park Yeshiva for Girls--Brooklyn
- Kinneret Day School--Brooklyn
- Yeshiva of Belle Harbor--Queens

Catholic Archdiocese of New York
- St. Aloysius School--Manhattan
- St. Bernard School--Manhattan
- Our Lady Queen of Angels School--Manhattan
- St. Stanislaus School--Manhattan
- Holy Spirit School--Bronx

Catholic Diocese of Brooklyn
- St. John the Baptist School--Brooklyn
- St. Rita School--Brooklyn
- St. Patrick School--Brooklyn
- Our Lady of the Cenacle School--Queens
- St. Anthony of Padua School--Queens
- St. Benedict Joseph Labre School--Queens

Greek Orthodox Archdiocese
- "A. Fantis" Parochial School--Brooklyn

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center, 33 West 42 Street, New York, N.Y. 10036

Minutes of the Advisory Committee Meeting
Nonpublic School Math Project, 1987-88
September 9, 1987

Members present: Mr. Morton Avigdor, Mr. Benjamin Miller, Sister Rita Nowatzki, Ms. May Santos, Dr. Andreas Zachariou, Prof. Barbara R. Heller, Dr. Jeffrey Miller

The meeting commenced at 10:10 a.m.

Prof. Heller began by reviewing the previous year's (1986-87) activities. The scope of the project was more limited than in the prior year (1985-86), and consisted of two visits each to 20 schools by the consultant, Dr. Anthony Giangrasso. The schools were given a choice from two activities for each visit: a group workshop for teachers by Dr. Giangrasso or individual observations of two teachers in their classes. Although successful, there were some problems resulting from both options. In the group workshops, teachers who did not teach math were often required to attend, resulting in some resentment on their parts. In the individual observations, the teachers sometimes felt that they were being evaluated for purposes of job assessment, which caused them to be apprehensive and defensive.

This year's planned project was then discussed. Prof. Heller mentioned that the scope of the original proposal had been narrowed, necessitating the elimination of summer activities (this action was caused not only by the reduction in the requested budget, but also by the fact that the state's fiscal year for grants is July 1 to June 30, which would cut summer activities in half). The 1987-88 project will therefore consist of three large-group meetings, one each for teachers of grades four, five, and six, in the fall, plus nine smaller study-group meetings for these same teachers in the spring.

Prof. Heller indicated that this year's project is still considered a continuation of the previous two years'. In order for funding to continue in the future, a new project must be developed, as the State Education Department will not fund continuations after three years. Some suggestions for new projects included computer-assisted instruction in math and science (by Ms. Santos); parent education (by Prof. Heller); and math education for early-grade teachers (by Sr. Rita). There was, in general, great interest shown in developing projects that utilized computers.

The next topic discussed was the selection of schools for this year. It was agreed that all schools which took part in 1986-87 would be asked to participate this year. In addition, after further discussion about schools from which other religious groups to include, it was decided that one additional school from each of the previously-participating organizations would be asked, plus one Episcopal school.

Each adviser agreed to contact the schools in his or her group; after a list of schools is developed, Prof. Heller will write to each principal and then contact the appropriate teachers to inform them about the meetings. Each meeting will be open to teachers of the other two grades (grades four, five, and six will participate this year). Early afternoon was agreed upon as the best time for meetings. The fall meetings will be held at the Graduate Center.

The spring study groups will be smaller, and will meet according to geographical location (Manhattan and the Bronx; Brooklyn and Staten Island; Queens). Each participant will do a project growing out of topics discussed at the fall meetings. The choice of consultants (and possible guest speakers) for both the fall and spring meetings was discussed, and several names were suggested. The sites for the spring meetings were also discussed, with general agreement that CUNY colleges, if possible, would be the best meeting sites. Ways to publicize the project were also considered.

The meeting adjourned at 12:00 noon.

(Minutes prepared by Dr. Jeffrey Miller)

✓cc: Dr. Mildred K. Lee

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

January 26, 1988

To: Participants at the Thursday, January 21 Workshop for Grade 4 (and other) Teachers from the Nonpublic Schools

From: Barbara R. Heller, Project Director Barbara Heller

Subject: Suggested Activities in Preparation for the Spring Study Sessions

At our Workshop on January 21, 1988, Dr. Susan Turkel suggested that, as preparation for the followup study sessions to be scheduled for late April-May, each participant try out three (3) activities involving the use of manipulatives with her/his class. This is just to remind you that you may use the manipulatives that were discussed at the Workshop or any others that you want to work with. You may also select one or more of the activities that were presented or find or design some of your own. The only requirement is that the activities for the children should, of course, be related to the mathematics curriculum.

Susan and I would like you to write up a brief paragraph or two about each activity--the problems you may have encountered as well as the positive outcomes and suggestions for other teachers. These will be the basis for the study sessions, after which we would like to be able to share everyone's activities, with the brief descriptions, with all the other participating teachers from all the schools. In this way, each person will have a large set of materials they can use in class.

If you have any questions now, or as you are exploring the manipulatives, please call me at (212) 575-1493. If I can't help you, Susan Turkel will call you back. We will be sending you the Spring Study Session schedule shortly and look forward to your continued interest in this project.

cc: Dr. Susan Turkel

The Graduate School and University Center
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Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

February 16, 1988

To: Participating Teachers, Nonpublic School Mathematics Project

From: Barbara R. Heller, Project Director BRH/gm

SAVE A DATE

Now that our January mathematics Workshops, in which many of you participated, have been successfully completed, it's time to begin planning for the Spring small study groups. These small group meetings will be held in different locations throughout the city and will continue our exploration of the use of manipulatives in math introduced in the Workshops.

All teachers, including those who were not able to attend a Workshop, are encouraged to come to one of the Spring study groups, and we will have packets of manipulative materials for those teachers who did not receive them in January. So, save a date! Although you might want to go to a study group led by the same person and dealing with the same grade as you attended previously, everyone is welcome to any and all of the study sessions. If you haven't come to one of the Workshops, it's still worthwhile to come to one or more study groups.

Registration forms and detailed travel directions will be sent to you in March, but in the meantime, please make note of the following dates and places (all study group sessions will take place from 1-4 p.m.):

Grade 4--Dr. Susan Turkel: Monday, April 18, CUNY Graduate Center (mid-Manhattan); Monday, April 25, Queens College (Queens); Monday, May 2, New York City Technical College (downtown Brooklyn).

Grade 5--Dr. Sandra Clarkson: Tuesday, April 19, CUNY Graduate Center; Tuesday, April 26, LaGuardia Community College (Long Island City, Queens); Tuesday, May 3, New York City Technical College.

Grade 6--Dr. Sandra Clarkson: Thursday, April 21, CUNY Graduate Center; Thursday, April 28, Queens College; Thursday, May 5, New York City Technical College.

You can call me at (212) 575-1493 if you have any questions about the upcoming meetings or about the manipulative materials we worked with in January.

cc: Dr. Sandra Clarkson
Dr. Susan Turkel
NPS Mathematics Advisory Group
Dr. Anne Marie Haase
Dr. Mitchell K. Lee

101

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center, 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

March 10, 1988

MEMORANDUM

To: Teachers who took part in the January Workshop Program, Manipulatives in Mathematics

From: Barbara R. Heller

At the January Workshops at which we introduced or reintroduced the concept of manipulatives in the teaching of mathematics in grades 4, 5, and 6, we asked that you try out some activities based on these types of materials with the children in your class.

Wanting to build on the excitement we hoped to generate, we asked that you develop or try out three exercises--using one or more types of manipulative material--and briefly write up what you did, how the students responded, and how you reacted to the lesson, noting particularly any recommendations or suggestions you would make to teachers like yourself. I am enclosing a "Manipulative Activity Form" that you might want to use for this purpose. However, your participation in this is voluntary and if you don't complete the little assignment for any reason it should not stand in the way of your coming to a study group session.

What we intend to do later in the Spring, in the small study groups, is to discuss the experiences you had, come up with some general principals, and develop a set of guidelines and specific activities that could be shared with all the teachers.

If you haven't yet tried using the manipulatives with your classes, I urge you again to consider doing so. Sandy Clarkson, Susan Turkel, and I are available--only a phone call away--should you want some feedback, a hint or two, or some gentle encouragement. My phone number is 212/575-1493 and if I'm not in, I'll call back by the next day. Look for the Spring study session schedule and travel directions that will be mailed to you shortly, and, until then, best wishes for a good holiday.

cc: Advisory Committee
Sandy Clarkson
Susan Turkel
✓Mildred K. Lee
Principals of participating schools

Center for Advanced Study in Education
Graduate School and University Center
The City University of New York

MANIPULATIVE ACTIVITY FORM
Nonpublic School Mathematics Project

Type of Manipulative (State name, describe activity, specify if commercially produced or made by teacher/students.)

The Activity (Describe the assignment for students, highlighting the points enumerated below.)

1. Objective (State the major purpose of the exercise--e.g., "to introduce the concept of area.")

2. Grade level of students/Type of grouping (E.g., fifth graders in groups of three--one set of manipulatives for every group.)

3. Students' responses (Note the level of interest, the observable impact on learning, and pertinent comments and reactions of students.)

4. Special Problems (include here any special problems, such as noise level, difficulty in handling small pieces, etc.)

Conclusions and Recommendations (State the outcomes of the activity, your conclusions about its worthwhileness, and your suggestions and recommendations for other teachers.)

Optional
Name: _____

School: _____

Use the reverse side of this page if you need more space.

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center, 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

March 10, 1988

MEMORANDUM

To: Teachers in grades 4, 5, and 6, nonpublic schools
From: Barbara R. Heller
Re: Spring study group sessions

As you may recall, the plan for this project called for small group sessions in the Spring in three different locations to follow up on some of the things we covered in the Grade 4, 5, and 6 Workshops held in January of this year.

Even though you were not able to attend a January Workshop, we feel that you will benefit by coming to one (or more) of the study group sessions scheduled for late April-early May. Within the next week or two, you will be sent a detailed schedule, including travel directions and a reservation form. I urge you to plan to attend.

The Workshops focused on the use of manipulatives in the teaching of mathematics and each participant received a packet containing a geoboard and rubber bands, a set of Cuisenaire rods, tangrams, and pattern blocks; we will provide you with you packet in one of the Spring sessions. We also asked participants at the Workshops to try three activities based on manipulatives with the children in their classes and to briefly report on the exercise and outcomes in the study group session. In a separate memo to them, we have enclosed a copy of the attached "Manipulative Activity Form" for them to use for this purpose.

Although it is entirely up to you, you might want to try to develop two or three exercises for your students that involve the use of these or other manipulatives and also briefly write about what you did, how the students responded, and what suggestions and ideas you have for other teachers. What we intend to do in the small study groups is to discuss everyone's experiences, come up with some general principles, and develop a set of guidelines and specific activities pertaining to manipulatives that can be shared with all teachers. If you want some ideas, a hint or two, or some more gentle encouragement, call me at 212/575-1493 and I'll put you in touch with our experts in math education.

Look for the study group schedule and start making plans to meet with us at one of the Spring sessions in a location accessible to your school.

cc: Advisory Committee
Sandy Clarkson
Susan Turkel
✓Mildred K. Lee
Principals of participating schools

10.4

APPENDIX B

ANALYSIS OF PARTICIPATING TEACHER QUESTIONNAIRE

Nonpublic School Math Project
1987-88
Analysis of "Participating Teacher Questionnaires"
February 5, 1988

Fourth Grade

7 teachers, all female, replied. Their lengths of teaching experience averaged 7.7 years (ranging from 2 to 15). They had been teaching at their present schools an average of 2 years each.

Question 2 on the questionnaire asked the teachers to rate their competence with each of seven manipulative materials. The scale used was from 1 to 5, with 1=Not at all competent and 5=Extremely competent. The average rating for all materials combined was 2.08. The average for each manipulative was as follows:

Attribute Blocks	2.14
Cuisenaire Rods	2.57
Decimal Blocks	1.71
Geoboards	2.14
Pattern Blocks	2.29
Polyminoes	1.71
Tangrams	2.00

Two of the teachers had worked with other manipulatives. These included Base 10 blocks, mulitlinks, fraction bars, dice, and dominoes.

On question 4, which listed 19 areas of mathematics, the average rating was 2.99.

Only one teacher had taken a course on the use of computers in elementary school, and one other had taken a course on the use of computers in mathematics

The answers to question 6, which asked the teachers what they would most like to accomplish in the program, seemed to fall into two categories. One was that the teachers desired to feel more comfortable with and competent in math, and the other was their interest in learning about new materials and technologies.

Fifth Grade

5 teachers, 4 female and 1 male, replied. Their average length of teaching experience was 10.6 years, with an average of 1.5 years at their present schools.

The average answer to all categories on question 2 was 2.48, with the breakdown being the following:

Attribute Blocks	2.25
Cuisenaire Rods	2.50
Decimal Blocks	2.50
Geoboards	3.00
Pattern Blocks	2.33
Polyminoes	2.25
Tangrams	2.50

Only one teacher had worked with any other manipulative, uniflex cards.

The average response on question 4, competency in general math topics, was 2.57.

No teachers had taken courses on computers in elementary schools or in mathematics.

The teachers mostly requested help in methods and computers.

Sixth Grade

5 teachers, all female, replied. Their average length of experience was 8.4 years, and they had served and average of 2.6 years each in their present schools.

Their average competency with manipulatives (question 2) was 2.00, with the categories breaking down as follows:

Attribute Blocks	1.4
Cuisenaire Rods	1.8
Decimal Blocks	1.8
Geoboards	2.6
Pattern Blocks	2.0
Polyminoes	2.0
Tangrams	2.4

None of the teachers had worked with any other manipulatives.

The average of answers on the general math question, question 4, was 3.13.

2 Teachers had taken courses on the use of the computer in elementary school, and 2 (the same one in one case) had taken courses on the use of computers in mathematics.

On question 6, the teachers indicated they wanted to understand math better and to learn new concepts and methodologies.

Averages of answers to question 4 (self-rated competency):

	Gr. 4	Gr. 5	Gr. 6
Algebra	3.57	2.00	3.40
Approximation and estimation	3.57	3.20	3.80
Logic; "If-then" reasoning	3.43	2.80	3.40
LOGO	1.71	1.80	1.75
Rational numbers, including fractions, decimals; Integers	3.29	3.20	3.80
Measurement, including metric system	3.29	3.00	3.60
Probability and statistics	2.86	2.00	2.60
Problem-solving	3.71	3.40	4.00
Spatial visualization	2.67	2.00	2.80
Transformational geometry (flips, slides, turns)	2.00	1.40	2.40
Numeration	4.00	2.50	4.25
Computation	4.29	3.50	4.75
New Graphics (stem & leaf, and box & whisker plots)	1.50	2.75	1.20
Calculators and computers	1.86	1.80	2.20
Patterns and functions	2.33	2.80	2.60
Matrices	2.17	2.00	2.20
Non-numerical operations	3.33	2.80	3.40
Mental arithmetic	3.86	3.00	4.00
Applications of mathematics	3.43	2.80	3.40

APPENDIX C

ANNOUNCEMENT/RESERVATION FORMS FOR JANUARY WORKSHOPS

CASE, the Center for Advanced study in Education of The City University of New York's Graduate School and University Center, with special funding from the New York State Education Department under Title II/EESA, is sponsoring a workshop for:

TEACHERS AND MATH SPECIALISTS
with a special focus on
GRADE 6 (also relevant to grades 4 & 5)

on:

TUESDAY, JANUARY 19, 1988

from:

1:00-4:15 p.m.
Desserts and beverages will be served

in:

Room 207

at:

THE CITY UNIVERSITY GRADUATE CENTER,
33 West 42 Street (between Fifth and Sixth Avenues, opposite the New York Public Library).
New York, NY 10036

for more information contact:

Barbara R. Heller, Project Director
(212) 575-1493
Room 300N

WORKSHOP PROGRAM
Tuesday, January 19, 1988

1:00-1:30 REGISTRATION
REFRESHMENTS

1:30-1:40 WELCOME

1:40-2:00 INTRODUCTION, "Using Manipulatives: Theory, Practice, and Reinforcement in the Classroom"

2:00-3:45 EXPLORATIONS WITH MANIPULATIVES, including

* Cuisenaire Rods
* Geoboards
* Polyminoes
* Attribute Blocks
* Tangrams
* Calculators (bring one!)

SPECIAL APPLICATIONS

Mental Arithmetic

Logic

Geometry

Statistics & Probability

Problem-solving

3:45-4:15 GENERAL DISCUSSION

Questions and Answers

DR. SANDRA P. CLARKSON, the workshop leader, is the Director of the Mathematics Learning Center at Hunter College, CUNY, and a Professor in the Department of Mathematical Sciences. She has been teaching since 1967, including three years of classroom experience with junior high school students. Dr. Clarkson is the author of several books, and has given talks and workshops for teachers across the country.

PARTICIPANTS, GRADE 6 (and 4 & 5) TEACHERS, will:

* practice specific skills under expert guidance
* have an opportunity to try out activities that are appropriate in the classroom
* learn hands-on techniques of proven motivation and interest to students
* develop teaching strategies that have special applications to the new mathematics curriculum
* receive resource kits and packets of materials that they can take back to their schools
* network with colleagues from other schools and obtain up-to-date information from authoritative sources

-A50-

-49-

RESERVATION FORM (return by 1/8/88

I will ___ will not ___ attend the January 19, 1988 Workshop for Grade 6 Teachers. I will ___ will not ___ also attend the workshops for:

Grade 4 ___ Grade 5 ___ teachers. I also understand that I am expected to attend at least one half-day study session in the Spring.

Name: Miss ___ Mrs. ___ Ms. ___ Mr. ___ _____

School: _____

Address: _____

_____

Phone # (days): (___) _____

Signature: _____

Current assignment (grade level, subject(s) taught): _____

_____

Briefly give your reasons for attending this workshop program: _____

_____

_____

MATHEMATICS APPLICATIONS:

Theory, Practice, and Reinforcement in the Classroom...

JANUARY 19, 1988

... a tuition-free mathematics workshop for GRADE 6 TEACHERS in Nonpublic Schools in New York City

112

CASE, the Center for Advanced study in Education of The City University of New York's Graduate School and University Center, with special funding from the New York State Education Department under Title II/EESA, is sponsoring a workshop for:

TEACHERS AND MATH SPECIALISTS
with a special focus on
GRADE 4 (also relevant to grades 5 & 6)

on:

THURSDAY, JANUARY 21, 1988

from:

1:00-4:15 p.m.
Desserts and beverages will be served

in:

Room 207

at:

THE CITY UNIVERSITY GRADUATE CENTER,
33 West 42 Street (between Fifth and Sixth Avenues, opposite the New York Public Library).
New York, NY 10036

for more information contact:

Barbara R. Heller, Project Director
(212) 575-1493
Room 300N

113

WORKSHOP PROGRAM
Thursday, January 21, 1988

1:00-1:30 REGISTRATION
REFRESHMENTS

1:30-1:40 WELCOME

1:40-2:15 INTRODUCTION, "Uses of Manipulatives in the Classroom -- Understanding the Why's"

2:15-3:15 DEMONSTRATION, with individual materials including

* Tangrams
* Cuisenaire Rods
* Pattern Blocks
* Geoboards
* Attribute Blocks
* Decimal Blocks

3:15-3:45 SPECIAL APPLICATIONS

Logic

Spatial Visualization

Problem-solving

Transformational Geometry

3:45-4:15 GENERAL DISCUSSION

Questions and Answers

DR. SUSAN TURKEL, the workshop leader, is currently a Professor in the School of Education, Queens College, CUNY. She has worked extensively with prospective elementary and middle school teachers and with teachers on an in-service basis. She is a consultant to school districts and universities, experienced in evaluating and conducting teacher training programs. Dr. Turkel has also published widely in the field of elementary school mathematics and is active in professional mathematics education organizations.

PARTICIPANTS, GRADE 4 (and 5 & 6) TEACHERS, will:

-A52-

* receive packets of materials and a resource kit that they can take back to their schools
* learn about activities they can use with their own students
* practice how-to's with a variety of manipulatives
* understand the appeal of hands-on materials for students
* get an opportunity to try out some new techniques under expert guidanc
* meet colleagues from other schools and obtain up-to-date information from authoritative sources

114

-51-

RESERVATION FORM (return by 1/8/88)

I will ___ will not ___ attend the January 21, 1988 Workshop for Grade 4 Teachers. I will ___ will not ___ also attend the workshops for:

Grade 5 ___ Grade 6 ___ teachers. I also understand that I am expected to attend at least one half-day study session in the Spring.

Name: Miss ___ Mrs. ___ Ms. ___ Mr. ___ _____

School: _____

Adress: _____

_____

Phone # (days): (___) _____

Signature: _____

Current assignment (grade level, subject(s) taught): _____

_____

Briefly give your reasons for attending this workshop program: _____

_____

_____

PEANUTS

I SIGNED UP FOR A NEW COURSE TODAY
IT'S CALLED "INTRODUCTION TO MATH"
IS IT HARD?
NOT AT ALL..
I JUST WALKED RIGHT IN AND SAID, "HOW DO YOU DO, MATH!"

USES OF MANIPULATIVES IN THE CLASSROOM...

JANUARY 21, 1988

... a tuition-free mathematics workshop for GRADE 4 TEACHERS in Nonpublic Schools in New York City

CASE, the Center for Advanced study in Education of The City University of New York's Graduate School and University Center, with special funding from the New York State Education Department under Title II/EESA, is sponsoring a workshop for:

TEACHERS AND MATH SPECIALISTS
with a special focus on
GRADE 5 (also relevant to grades 4 & 6)

on:

TUESDAY, JANUARY 26, 1988

from:

1:00-4:15 p.m.
Desserts and beverages will be served

in:

Room 207

at:

THE CITY UNIVERSITY GRADUATE CENTER,
33 West 42 Street (between Fifth and Sixth Avenues, opposite the New York Public Library).
New York, NY 10036

for more information contact:

Barbara R. Heller, Project Director
(212) 575-1493
Room 300N

WORKSHOP PROGRAM
Tuesday, January 26, 1988

1:00-1:30	REGISTRATION REFRESHMENTS
1:30-1:40	WELCOME
1:40-2:00	INTRODUCTION, "Manipulatives and the Teaching of Mathematics--Motivating Learning"
2:00-3:45	EXPLORATIONS WITH MANIPULATIVES, including * Cuisenaire Rods * Geoboards * Tangrams * Attribute Blocks * Calculators (bring one!) SPECIAL APPLICATIONS Logic Measurement Patterns and functions Geometry Problem-solving
3:45-4:15	GENERAL DISCUSSION Questions and Answers

DR. SANDRA P. CLARKSON, the workshop leader, is the Director of the Mathematics Learning Center at Hunter College, CUNY, and a Professor in the Department of Mathematical Sciences. She has been teaching since 1967, including three years of classroom experience with junior high school students. Dr. Clarkson is the author of several books, and has given talks and workshops for teachers across the country.

PARTICIPANTS, GRADE 5 (and 4 & 6) TEACHERS, will:

* practice specific skills under expert guidance
* have an opportunity to try out activities that are appropriate in the classroom
* learn hands-on techniques of proven motivation and interest to students
* develop teaching strategies that have special applications to the new mathematics curriculum
* receive resource kits and packets of materials that they can take back to their schools
* network with colleagues from other schools and obtain up-to-date information from authoritative sources

RESERVATION FORM (return by 1/8/88)

I will ___ will not ___ attend the January 26, 1988 Workshop for Grade 5 Teachers. I will ___ will not ___ also attend the workshops for:

Grade 4 ___ Grade 6 ___ teachers. I also understand that I am expected to attend at least one half-day study session in the Spring.

Name: Miss ___ Mrs. ___ Ms. ___ Mr. ___ _____

School: _____

Address: _____

_____

Phone # (days): ( ) _____

Signature: _____

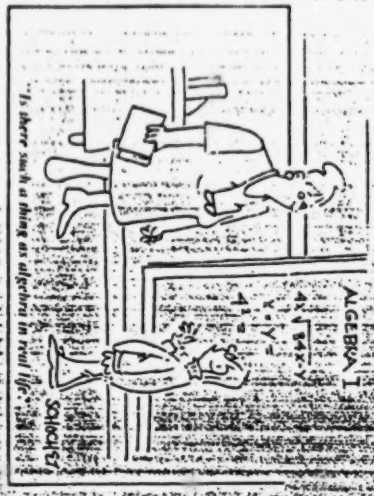
Current assignment (grade level, subject(s) taught): _____

_____

Briefly give your reasons for attending this workshop program: _____

_____

_____



MANIPULATIVES AND THE TEACHING OF MATHEMATICS...

JANUARY 26, 1988

...a tuition-free mathematics workshop for GRADE 5 TEACHERS in Nonpublic Schools in New York City

BEST COPY AVAILABLE

APPENDIX D

SAMPLE RESOURCE MATERIALS DISTRIBUTED AT JANUARY WORKSHOPS

SOME GENERAL GUIDELINES FOR THE USE OF MANIPULATIVE DEVICES

Each manipulative device has its own particular set of instructions that should be followed if one is to achieve maximum effectiveness from its use. There are, however, a number of general guidelines that can be helpful to the teacher in the selection and use of manipulative devices. The following are suggestive:

1. Choose the device that best suits the purpose of the lesson and will help attain the objective.
2. Become familiar with the device and the techniques for making effective use of it.
3. Correlate the operations depicted by the device with those to be done either with pencil and paper or on the chalkboard.
4. If possible, arrange for each child to have his own device. If this is not possible, make certain that each child has the opportunity to use the device many times.
5. Try to create an atmosphere that encourages rather than forces the use of devices.
6. Create opportunites, as soon as possible, for each child to become progressively less dependent on manipulative devices and more dependent on using symbolism and abstractions.
7. Have the child stop using a device when he is ready for a higher, more abstract level so that the device does not become a crutch.
8. Use a "math caddy" or movable storage unit designed to hold and properly display devices in order to increase their usefulness.

Manipulative devices will not teach mathematics. It is their use by the teacher and his guidance of pupils' use that determines the usefulness of devices in learning.

SOME CHARACTERISTICS OF GOOD MANIPULATIVE DEVICES

Many attempts have been made to prepare lists of characteristics that good manipulative devices should possess. Most authors agree that a good manipulative device should—

1. be relevant to the mathematical content with a desirable outcome in mind;
2. exploit as many senses as possible;
3. be durable, its durability being commensurate with its cost and anticipated usage;
4. be constructed so that its details are accurate;
5. have high standards of craftsmanship so that parts are not easily broken or lost;
6. be attractive in appearance;
7. be maintained easily and at a reasonable cost;
8. be adaptable to the school facilities (considering mobility and convenience of storage);
9. be simple to assemble;
10. be flexible and have a variety of uses;
11. be simple to operate;
12. be large enough to be easily visible to all pupils, if used for demonstrations;
13. either involve a moving part or parts or be something that is moved in the process of illustrating the mathematical principle involved.

In the final analysis, the devices that are effective and efficient in helping the child understand the mathematical concept to be learned are the devices that should be used.

APPENDIX B

SCHOOL SELECTION AND TEACHER RECRUITMENT

Agenda, Advisory Committee Meeting, 9/9/87 . . . . . B1

Minutes of 9/9/87 Advisory Committee Meeting B3

Final List of Participating Schools. . . . . .(see Attachment #1, cover sheets)

10/21/87 Sample Letter to Principals of Participating Schools. B5

11/13/87 Sample Letter to Participating Teachers, Grades 4, 5, 6 . . . . . B7

Center for Advanced Study in Education
The Graduate School and University Center
The City University of New York

Advisory Committee Meeting

MATHEMATICS INSTRUCTION IN NEW YORK CITY'S NONPUBLIC SCHOOLS, 1987-88

September 9, 1987, 10:00 a.m
CUNY Graduate School, Rm. 300N

AGENDA

1. Overview of last year's (1986-87) project:
   - Accomplishments
   - Results and recommendations
   - Advisors' feedback

2. Current project (1987-88 school year):
   - Objectives
   - Selection of schools (20 "old" & 6 "new" schools including one school from each of the following groups: Episcopalians, Lutherans, Mormons, Seventh-Day Adventists):
     Schools' responsibility to project
   - Selection of technical consultants
   - Fall large-group meetings (at Graduate Center) for teachers of grades 4, 5, 6:
     Scheduling
     Opening meeting to other schools
   - Spring study groups:
     3 for each of grades 4, 5, and 6
     In 3 locations: Manhattan and the Bronx; Queens; Brooklyn and Staten Island
   - Advisors' suggestions for scheduling, site selection, and limiting participation

3. Additional Advisory Committee meetings

4. Publicizing the Project (articles in newletters, special announcements, and so on)

Advisory Committee Representatives: Mr. Morton Avigdor, Agudath Israel of America; Mr. Benjamin Miller, Board of Jewish Education; Sister Rita Nowatzki, Catholic Archdiocese of New York; Ms. May Santos, Catholic Diocese of Brooklyn; Dr. Andreas Zachariou, Greek Orthodox Archdiocese; Dean Seymour P. Lachman, University Dean for Community Development (ex officio); Dr. Bert Flugman, CASE (ex officio); Professor Barbara R. Heller, Project Director; Dr. Jeffrey Miller, Project Associate; Dr. Mildred K. Lee, Evaluation Consultant (ex officio).

* List of 1986-87 schools attached

MATHEMATICS INSTRUCTION IN NEW YORK CITY'S NONPUBLIC SCHOOLS

Participating Schools, 1986-87

Agudath Israel of America
- Bais Yaaov Academy of Queens--Queens
- Yeshiva and Mesivta Ohr Yisroel--Queens

Board of Jewish Education
- Bialik School--Brooklyn
- Crown Heights Yeshiva--Brooklyn
- Mizrachi L'Banim--Brooklyn
- Prospect Park Yeshiva for Girls--Brooklyn
- Kinneret Day School--Brooklyn
- Yeshiva of Belle Harbor--Queens

Catholic Archdiocese of New York
- St. Aloysius School--Manhattan
- St. Bernard School--Manhattan
- Our Lady Queen of Angels School--Manhattan
- St. Stanislaus School--Manhattan
- Holy Spirit School--Bronx

Catholic Diocese of Brooklyn
- St. John the Baptist School--Brooklyn
- St. Rita School--Brooklyn
- St. Patrick School--Brooklyn
- Our Lady of the Cenacle School--Queens
- St. Anthony of Padua School--Queens
- St. Benedict Joseph Labre School--Queens

Greek Orthodox Archdiocese
- "A. Fantis" Parochial School--Brooklyn

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036

Minutes of the Advisory Committee Meeting
Nonpublic School Math Project, 1987-88
September 9, 1987

Members present: Mr. Morton Avigdor, Mr. Benjamin Miller, Sister Rita Nowatzki, Ms. May Santos, Dr. Andreas Zachariou, Prof. Barbara R. Heller, Dr. Jeffrey Miller

The meeting commenced at 10:10 a.m.

Prof. Heller began by reviewing the previous year's (1986-87) activities. The scope of the project was more limited than in the prior year (1985-86), and consisted of two visits each to 20 schools by the consultant, Dr. Anthony Giangrasso. The schools were given a choice from two activities for each visit: a group workshop for teachers by Dr. Giangrasso or individual observations of two teachers in their classes. Although successful, there were some problems resulting from both options. In the group workshops, teachers who did not teach math were often required to attend, resulting in some resentment on their parts. In the individual observations, the teachers sometimes felt that they were being evaluated for purposes of job assessment, which caused them to be apprehensive and defensive.

This year's planned project was then discussed. Prof. Heller mentioned that the scope of the original proposal had been narrowed, necessitating the elimination of summer activities (this action was caused not only by the reduction in the requested budget, but also by the fact that the state's fiscal year for grants is July 1 to June 30, which would cut summer activities in half). The 1987-88 project will therefore consist of three large-group meetings, one each for teachers of grades four, five, and six, in the fall, plus nine smaller study-group meetings for these same teachers in the spring.

Prof. Heller indicated that this year's project is still considered a continuation of the previous two years'. In order for funding to continue in the future, a new project must be developed, as the State Education Department will not fund continuations after three years. Some suggestions for new projects included computer-assisted instruction in math and science (by Ms. Santos); parent education (by Prof. Heller); and math education for early-grade teachers (by Sr. Rita). There was, in general, great interest shown in developing projects that utilized computers.

The next topic discussed was the selection of schools for this year. It was agreed that all schools which took part in 1986-87 would be asked to participate this year. In addition, after further discussion about schools from which other religious groups to include, it was decided that one additional school from each of the previously-participating organizations would be asked, plus one Episcopal school.

Each adviser agreed to contact the schools in his or her group; after a list of schools is developed, Prof. Heller will write to each principal and then contact the appropriate teachers to inform them about the meetings. Each meeting will be open to teachers of the other two grades (grades four, five, and six will participate this year). Early afternoon was agreed upon as the best time for meetings. The fall meetings will be held at the Graduate Center.

The spring study groups will be smaller, and will meet according to geographical location (Manhattan and the Bronx; Brooklyn and Staten Island; Queens). Each participant will do a project growing out of topics discussed at the fall meetings. The choice of consultants (and possible guest speakers) for both the fall and spring meetings was discussed, and several names were suggested. The sites for the spring meetings were also discussed, with general agreement that CUNY colleges, if possible, would be the best meeting sites. Ways to publicize the project were also considered.

The meeting adjourned at 12:00 noon.

(Minutes prepared by Dr. Jeffrey Miller)

cc: Dr. Mildred K. Lee

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

SAMPLE

October 21, 1987

CASE (the Center for Advanced Study in Education), of The City University of New York's Graduate School, has received another grant to work with the nonpublic schools in New York City in promoting quality mathematics instruction in grades 4, 5, and 6. Funding for the activities comes from the New York State Education Department, under Title II of the EESA.

Your school was one of 26 identified as being interested in this project and, when you spoke with Ms. May Santos of the Catholic Diocese of Brooklyn, you confirmed your interest in taking part in it. Now I would like to bring you up to date about the plans for the 1987-88 school year.

For those schools that participated before, this is the third year of the project, but the first time the focus has been strictly narrowed to teachers in grades 4, 5, and 6 who have responsibility for teaching mathematics. The reason for this is not only are these the critical grades in terms of the development of children's math-related attitudes and skills, but they are also the grades during which mathematics changes from the more intuitive to the more cognitive-based.

To get started, I will need from you fairly immediately the names of the teachers of grades 4, 5, and 6 whom you would like to participate. After you determine their interest, please provide me with their names so that I may solicit their opinions about important topics and also write to them about the upcoming activities. (Please ask for me or for Jeffrey Miller, the Project Assistant, at 212/575-1493 when you call.)

The plans are for three mathematics workshops for this winter: one for the grade 4 teachers from the 26 schools, one for the fifth grade teachers, and the third workshop for the grade 6 teachers with responsibility for teaching mathematics. Each workshop will be scheduled from about 1:30 to 4:30 p.m. Although all teachers (that is, <u>all</u> but <u>only</u> grade 4, 5, and 6 teachers) are welcome at all three workshops, the intent of each one is to deal with those mathematical issues that are particularly germane to that grade (recognizing, of course, that there is a great amount of overlap). Experts in elementary school mathematics and math education will direct these workshops which will be held at The City University of New York Graduate School in mid-Manhattan (opposite

the New York Public Library). The teacher participants will work on problems they said they were encountering in the classroom, using materials and other resources that we will provide.

I will get back to you and to the concerned teachers with the exact dates of these three workshops as soon as they are confirmed.

Small group followup meetings for teachers from the targeted grades are being planned for the Spring term. Again, we will be holding separate sessions for grade 4, 5, and 6 teachers at locations closer to your school. For example, for each grade level we will schedule a meeting for Manhattan and Bronx teachers, one for Queens teachers, and one for Brooklyn and Staten Island teachers from each grade (for a total of 9 small group meetings). We expect each teacher from your school to attend one such meeting, although she/he is welcome to come to all three meetings in the different locations for that grade. (In fact, he/she would be welcome at all 9 meetings--or at any number and combination.) The purpose of these meetings is for teachers to share the outcomes of their experiences with the particular problems they chose to work on with their students at the winter workshop.

We will continue to keep you and your staff informed of the plans for these small-group meetings.

I will call you within the next two weeks with definite dates for the three winter workshops and with a progress report on the other activities. If you have any questions about the project before I telephone, and especially if you have selected the participating grade 4, 5, and 6 teachers and can give me their names, please call me (or Jeffrey Miller) at 212/575-1493.

I look forward to working with you.

Sincerely yours,

SAMPLE

Barbara R. Heller
Project Director

cc: Advisory Committee members
Dr. Mildred K. Lee
Dr. Susan Turkel
Dr. Sandra Clarkson

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

SAMPLE

November 13, 1987

Dear Colleague:

Your principal has nominated you and other teachers from your school to take part in our project to promote quality mathematics instruction in grades 4, 5, and 6 in selected nonpublic schools in New York City.

I'd like to tell you some things about the project as well as a little about myself and my organization, and also ask you to complete a short questionnaire (only six questions) that will help us plan the details of the upcoming workshop meetings.

My organization, CASE--the Center for Advanced Study in Education of The City University of New York's Graduate Center--designs educational programs that respond to the needs of children in the public and nonpublic schools as well as the needs of teachers and administrators. As a senior CASE project director, I have been concentrating on mathematics for the last 10 years. Since 1985, I have been conducting a staff development project for teachers from schools affiliated with the Roman Catholic, Jewish, Greek Orthodox, and Episcopal religions.

This year's project involves teachers in grades 4, 5, and 6--grades we believe are critical to the formation of positive attitudes, good skills, and a cognitive approach to mathematics. We plan to work with teachers from one grade at a time, although all the teachers in the project are eligible to come to all the meetings.

For the first phase, we will be holding three workshops in January 1988, one each for teachers of grades 4, 5, and 6. Each workshop is scheduled from 1:00-4:30 p.m.:

- Grade 4 teachers will meet on Thursday, January 21
- Grade 5 teachers will meet on Tuesday, January 26
- Grade 6 teachers will meet on Tuesday, January 19.

Although I will be sending you a reminder invitation and workshop agenda, please make a note of the date of the meeting(s) you will be attending. Also note the we will be offering refreshments--coffee and tea and desserts.

All three workshops will be held at the City University Graduate Center in mid-Manhattan, opposite the New York Public Library. Some of you have attended our workshops before and know that we are very accessible to all forms of public transportation--including parking, although parking in the neighborhood is very expensive.

Each workshop will emphasize a particular topic in the elementary school mathematics curriculum and will be led by an expert in elementary math education. We will provide you with materials, resource kits, and lists of suggested readings. To plan the content of the workshop and the materials, we need to have your feedback. Please complete the questionnaire included with this letter, and return it to me as soon as possible. Feel free to call me with any questions you have about the program or about the enclosed survey.

In the Spring, probably in March-May, we will be offering followup sessions at locations more convenient to your school. There will be three meetings for grade 4 teachers, three for grade 5 teachers, and three of these study sessions for grade 6 teachers. You are expected to attend at least one session for your grade, although you may come to all three and/or one or all of the sessions for the other two grade levels. I'll keep you up-to-date about the plans for the Spring as they develop.

For now, please fill out and return the questionnaire and mark your calendar for the January workshop(s).

We are looking forward to working with you and feel quite confident in anticipating that you will find that taking part in this project is both enjoyable and rewarding.

Sincerely yours,

Barbara R. Heller

Barbara R. Heller
Project Director

SAMPLE

cc: Advisory Committee representatives
Principals of the participating schools
Dr. Susan Turkel
Dr. Sandra Clarkson
Dr. Mildred K. Lee

APPENDIX C

FORMATIVE EVALUATION FORMS AND INSTRUMENTS

Initial Needs Assessment, "Participating Teacher Questionnaire" C1

Workshop Rating Form, "Participating Teacher Rating Form" C3

Study Session Rating Form, "Participating Teacher Rating Form" C9

Manipulative Activity Form C11

MATHEMATICS CENTER, NONPUBLIC SCHOOLS

PARTICIPATING TEACHER QUESTIONNAIRE

Dear Colleague:

To help us plan the activities for the January workshop meetings, we need to know about your background experiences with selected topics in mathematics and some teaching strategies.

Please answer the following six questions as candidly as possible and return the completed questionnaire to:

B.R. Heller, Project Director
CASE, Room 300
25 West 43rd Street
New York, N.Y. 10036

Thank you for your cooperation.

Please use the following scale to rate your competence on each of the items in questions 2 and 4.

1 = Not at all competent
2 = Not particularly competent
3 = Moderately competent
4 = Competent
5 = Extremely competent

1. Please complete the following information about yourself.

Sex: Male_____ Female_____

Current grade level taught: ____4 ____5 ____6 ____Other; please indicate____

How many years have you been teaching? _____

How many years have you taught in your present school? _____

2. Circle the number that best describes how competent you feel with each of following materials:

Attribute Blocks	1	2	3	4	5
Cuisenaire Rods	1	2	3	4	5
Decimal Blocks	1	2	3	4	5
Geoboards	1	2	3	4	5
Pattern Blocks	1	2	3	4	5
Polyminoes	1	2	3	4	5
Tangrams	1	2	3	4	5

3. What other manipulative materials do you use in teaching mathematics? List only manipulatives that are not included above.

_____

_____

What other manipulative materials would you like to learn more about?

_____

_____

(please turn over)

4. How competent are you teaching each of the following topics? (Use the scale on the reverse side.)

Algebra	1	2	3	4	5
Approximation and Estimation	1	2	3	4	5
Logic; "If-Then" Reasoning	1	2	3	4	5
LOGO	1	2	3	4	5
Rational Numbers, including fractions, decimals; Integers	1	2	3	4	5
Measurement, including Metric System	1	2	3	4	5
Probability and Statistics	1	2	3	4	5
Problem-Solving	1	2	3	4	5
Spatial Visualization	1	2	3	4	5
Transformational Geometry (flips, slides, turns)	1	2	3	4	5
Numeration	1	2	3	4	5
Computation	1	2	3	4	5
New Graphics (stem & leaf, and box & whisker plots)	1	2	3	4	5
Calculators and Computers	1	2	3	4	5
Patterns and Functions	1	2	3	4	5
Matrices	1	2	3	4	5
Non-Numerical Operations	1	2	3	4	5
Mental Arithmetic	1	2	3	4	5
Applications of Mathematics	1	2	3	4	5

5. Have you taken a course (inservice or other) on the use of the computer in elementary school?

_____ No

_____ Yes; if yes, please describe: _____

Have you ever taken a course on the use of the computer in mathematics?

_____ No

_____ Yes; if yes, please describe: _____

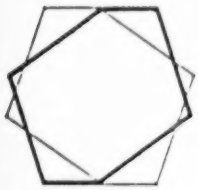
6. Based on what you know about our program, what would you most like to accomplish as a result of taking part in the Mathematics Center project for nonpublic school teachers? Please be specific:

_____

_____

_____

Thank you for completing this questionnaire. If you have any questions, please call B.R. Heller at 212/575-1493.



The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education

MATHEMATICS CENTER, NONPUBLIC SCHOOLS
PARTICIPATING TEACHER RATING FORM

Workshop 4-0 No. _____ Date _____ Grade _____

Your candid and complete responses to the Evaluation information below will help us to judge the value of today's Workshop presentation, resource materials, and interaction.

I. I LIKED THIS WORKSHOP BECAUSE... (Check all that apply.)

1. I received new information. . . . . ___
2. some ideas I heard before were presented in new ways. . . . . ___
3. the presenter was knowledgeable. . . . . ___
4. the presenter was interesting. . . . . ___
5. the presenter covered the topic. . . . . ___
6. the ideas presented were practical. . . . . ___
7. it gave me new ideas and/or activities to try in my classroom. . ___
8. it motivated me to try some new techniques. . . . . ___
9. the presentation was clear. . . . . ___
10. I received useful resource materials. . . . . ___
11. the presentation was consistent with the Workshop's grade level. ___
12. the presentation was sequential and developmental. . . . . ___
13. the presenter was well prepared. . . . . ___
14. the presentation was well paced. . . . . ___
15. the presenter used sound pedagogical techniques. . . . . ___
16. the presenter's vocabulary was appropriate. . . . . ___
17. the presenter made enlightening clarifications in response to questions. . . . . ___
18. I had an opportunity to network with colleagues from other schools. ___
19. I learned additional teaching strategies that have special applications to the new mathematics curriculum. . . . . ___
20. it made me feel more confident about the new math curriculum. . ___
21. it made me feel more professional. . . . . ___
22. Other (Be specific, please!)_____

_____

_____

_____

_____

_____

II. I WOULD HAVE LIKED THIS WORKSHOP BETTER IF... (Please fill in.)

1. More information had been provided on _____

_____

2. (IF) it met my needs for _____

_____

3. (IF) it met my students' needs for _____

_____

4. Other (Specify other ways in which you would have liked this Workshop more.)

_____

_____

III. OVERALL ASSESSMENT

1. Please circle a number below to indicate your overall assessment to this Workshop:

1	2	3	4	5
POOR	BELOW AVERAGE	AVERAGE	ABOVE AVERAGE	OUTSTANDING

2. Briefly specify the reasons or factors underlying your overall assessment.

_____

_____

_____

_____

Thank you for completing this evaluation.

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education

MATHEMATICS CENTER, NONPUBLIC SCHOOLS
PARTICIPATING TEACHER RATING FORM

Workshop No. 5-0 _____ Date _____ Grade

Your candid and complete responses to the Evaluation information below will help us to judge the value of today's Workshop presentation, resource materials, and interaction.

I. I LIKED THIS WORKSHOP BECAUSE... (Check all that apply.)

1. I received new information. . . . . ___
2. some ideas I heard before were presented in new ways. . . . . ___
3. the presenter was knowledgeable. . . . . ___
4. the presenter was interesting. . . . . ___
5. the presenter covered the topic. . . . . ___
6. the ideas presented were practical. . . . . ___
7. it gave me new ideas and/or activities to try in my classroom. . ___
8. it motivated me to try some new techniques. . . . . ___
9. the presentation was clear. . . . . ___
10. I received useful resource materials. . . . . ___
11. the presentation was consistent with the Workshop's grade level. ___
12. the presentation was sequential and developmental. . . . . ___
13. the presenter was well prepared. . . . . ___
14. the presentation was well paced. . . . . ___
15. the presenter used sound pedagogical techniques. . . . . ___
16. the presenter's vocabulary was appropriate. . . . . ___
17. the presenter made enlightening clarifications in response to questions. . . . . ___
18. I had an opportunity to network with colleagues from other schools. ___
19. I learned additional teaching strategies that have special applications to the new mathematics curriculum. . . . . ___
20. it made me feel more confident about the new math curriculum. . ___
21. it made me feel more professional. . . . . ___
22. Other (Be specific, please!)_____

_____

_____

_____

_____

_____

(over)

II. I WOULD HAVE LIKED THIS WORKSHOP BETTER IF... (Please fill in.)

1. More information had been provided on _____

_____

2. (IF) it met my needs for _____

_____

3. (IF) it met my students' needs for _____

_____

4. Other (Specify other ways in which you would have liked this Workshop more.)

_____

_____

III. OVERALL ASSESSMENT

1. Please circle a number below to indicate your overall assessment to this Workshop:

1	2	3	4	5
POOR	BELOW AVERAGE	AVERAGE	ABOVE AVERAGE	OUTSTANDING

2. Briefly specify the reasons or factors underlying your overall assessment.

_____

_____

_____

_____

Thank you for completing this evaluation.

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education

MATHEMATICS CENTER, NONPUBLIC SCHOOLS
PARTICIPATING TEACHER RATING FORM

Workshop No. 6-0 _____ Date _____ Grade

Your candid and complete responses to the Evaluation information below will help us to judge the value of today's Workshop presentation, resource materials, and interaction.

I. I LIKED THIS WORKSHOP BECAUSE... (Check all that apply.)

1. I received new information. . . . . ___
2. some ideas I heard before were presented in new ways. . . . . ___
3. the presenter was knowledgeable. . . . . ___
4. the presenter was interesting. . . . . ___
5. the presenter covered the topic. . . . . ___
6. the ideas presented were practical. . . . . ___
7. it gave me new ideas and/or activities to try in my classroom. . ___
8. it motivated me to try some new techniques. . . . . ___
9. the presentation was clear. . . . . ___
10. I received useful resource materials. . . . . ___
11. the presentation was consistent with the Workshop's grade level. ___
12. the presentation was sequential and developmental. . . . . ___
13. the presenter was well prepared. . . . . ___
14. the presentation was well paced. . . . . ___
15. the presenter used sound pedagogical techniques. . . . . ___
16. the presenter's vocabulary was appropriate. . . . . ___
17. the presenter made enlightening clarifications in response to questions. . . . . ___
18. I had an opportunity to network with colleagues from other schools. ___
19. I learned additional teaching strategies that have special applications to the new mathematics curriculum. . . . . ___
20. it made me feel more confident about the new math curriculum. . ___
21. it made me feel more professional. . . . . ___
22. Other (Be specific, please!)_____

_____

_____

_____

_____

_____

(over)

II. I WOULD HAVE LIKED THIS WORKSHOP BETTER IF... (Please fill in.)

1. More information had been provided on _____

_____

2. (IF) it met my needs for _____

_____

3. (IF) it met my students' needs for _____

_____

4. Other (Specify other ways in which you would have liked this Workshop more.)

_____

_____

III. OVERALL ASSESSMENT

1. Please circle a number below to indicate your overall assessment to this Workshop:

1	2	3	4	5
POOR	BELOW AVERAGE	AVERAGE	ABOVE AVERAGE	OUTSTANDING

2. Briefly specify the reasons or factors underlying your overall assessment.

_____

_____

_____

_____

Thank you for completing this evaluation.

III. I WOULD HAVE LIKED THIS SESSION BETTER IF... (Please fill in.)

1. More information had been provided about _____

_____

2. (IF) it met my needs for _____

_____

3. (IF) it met my students' needs for _____

_____

4. Other (Specify other ways in which you would have liked today's session more.)

_____

_____

IV. Please briefly describe two specific ideas, suggestions, or techniques you learned as a result of this program:

1. _____

2. _____

V. How confident do you now feel about introducing the use of manipulatives into a mathematics lesson for the children in your class? (Circle one number.)

1	2	3	4	5
Not confident at all	Not very confident	Neither confident nor not confident	Somewhat confident	Very confident

Please describe what kind of additional information or support you would need to work with manipulatives in your math lessons:

_____

_____

_____

Thank you for completing this evaluation. Please hand it in today or mail it to: B.R. Heller, CASE, Room 300N, CUNY Graduate Center, 25 West 43rd Street New York, NY 10036

Name: _____

School: _____

MATHEMATICS CENTER, NONPUBLIC SCHOOLS
Participating Teacher Rating Form
Center for Advanced Study in Education
The Graduate School and University Center, The City University of New York

Study Session No. ___

Date _____

Your candid and complete responses to the information below will help us to evaluate the value of today's presentation, resource materials, and interaction.

I. I LIKED THIS SESSION BECAUSE... (Check all that apply.)

___I received new information
___some ideas I heard before were presented in new ways
___the presenter was knowledgeable
___the presenter was interesting
___the presenter covered the topic
___the ideas presented were practical
___it gave me new ideas and/or activities to try in my classroom
___it motivated me to try some new techniques
___the presentation was clear
___the presenter was well prepared
___the presentation was well paced
___the presenter used sound pedagogical techniques
___the presenter's vocabulary was appropriate
___the presenter answered questions clearly and to the point
___I had an opportunity to network with colleagues from other schools
___I learned additional teaching strategies that have special applications to the new mathematics curriculum
___it made me feel more confident about the new math curriculum
___it made me feel more professional
___other (be specific, please) _____

II. OVERALL ASSESSMENT

Please circle a number below to indicate your overall assessment of this Session:

1	2	3	4	5
Poor	Below Average	Average	Above Average	Outstanding

Briefly specify the reasons or factors underlying your overall assessment.

(over)

Center for Advanced Study in Education
Graduate School and University Center
The City University of New York

MANIPULATIVE ACTIVITY FORM
Nonpublic School Mathematics Project

Type of Manipulative (State name, describe activity, specify if commercially produced or made by teacher/students.)

The Activity (Describe the assignment for students, highlighting the points enumerated below.)

1. Objective (State the major purpose of the exercise--e.g., "to introduce the concept of area.")

2. Grade level of students/Type of grouping (E.g., fifth graders in groups of three--one set of manipulatives for every group.)

3. Students' responses (Note the level of interest, the observable impact on learning, and pertinent comments and reactions of students.)

4. Special Problems (include here any special problems, such as noise level, difficulty in handling small pieces, etc.)

Conclusions and Recommendations (State the outcomes of the activity, your conclusions about its worthwhileness, and your suggestions and recommendations for other teachers.)

Optional
Name: _____

School: _____

Use the reverse side of this page if you need more space.

APPENDIX D

WORKSHOPS- AND STUDY GROUPS-RELATED MATERIALS

Uses of Manipulatives in the Classroom (Grade 4) D1

Manipulatives and the Teaching of Mathematics (Grade 5). D3

Mathematics Applications (Grade 6) D5

"Project for Sixth Grade Teachers" (Sample). D7

Followup Letter to Teachers in Grade 4 (and 5), 1/26/88. . . . . D8

Memorandum to Participating Teachers, 2/16/88. . . . . D9

Memorandum to Teachers Who Took Part in the Workshops, 3/10/88 . . . . . D10

Memorandum to (Other) Teachers in Grades 4, 5, and 6, and Manipulative Activity Form, 3/10/88. . . . . D11

Memorandum to Participating Teachers With Study Group Reservation Form, 3/18/88. . . . . D13

CASE, the Center for Advanced study in Education of The City University of New York's Graduate School and University Center, with special funding from the New York State Education Department under Title II/EESA, is sponsoring a workshop for:

TEACHERS AND MATH SPECIALISTS
with a special focus on
GRADE 4 (also relevant to grades 5 & 6)

on:

THURSDAY, JANUARY 21, 1988

from:

1:00-4:15 p.m.
Desserts and beverages will be served

in:

Room 207

at:

THE CITY UNIVERSITY GRADUATE CENTER,
33 West 42 Street (between Fifth and Sixth Avenues, opposite the New York Public Library).
New York, NY 10036

for more information contact:

Barbara R. Heller, Project Director
(212) 575-1493
Room 300N

WORKSHOP PROGRAM
Thursday, January 21, 1988

1:00-1:30 REGISTRATION
REFRESHMENTS

1:30-1:40 WELCOME

1:40-2:15 INTRODUCTION, "Uses of Manipulatives in the Classroom -- Understanding the Why's"

2:15-3:15 DEMONSTRATION, with individual materials including

* Tangrams
* Cuisenaire Rods
* Pattern Blocks
* Geoboards
* Attribute Blocks
* Decimal Blocks

3:15-3:45 SPECIAL APPLICATIONS

Logic

Spatial Visualization

Problem-solving

Transformational Geometry

3:45-4:15 GENERAL DISCUSSION

Questions and Answers

DR. SUSAN TURKEL, the workshop leader, is currently a Professor in the School of Education, Queens College, CUNY. She has worked extensively with prospective elementary and middle school teachers and with teachers on an in-service basis. She is a consultant to school districts and universities, experienced in evaluating and conducting teacher training programs. Dr. Turkel has also published widely in the field of elementary school mathematics and is active in professional mathematics education organizations.

PARTICIPANTS, GRADE 4 (and 5 & 6) TEACHERS, will:

* receive packets of materials and a resource kit that they can take back to their schools
* learn about activities they can use with their own students
* practice how-to's with a variety of manipulatives
* understand the appeal of hands-on materials for students
* get an opportunity to try out some new techniques under expert guidance
* meet colleagues from other schools and obtain up-to-date information from authoritative sources

RESERVATION FORM (return by 1/8/88)

I will ___ will not ___ attend the January 21, 1988 Workshop for Grade 4 Teachers. I will ___ will not ___ also attend the workshops for:

Grade 5 ___ Grade 6 ___ teachers. I also understand that I am expected to attend at least one half-day study session in the Spring.

Miss ___
Name: Mrs. ___ _____
Ms. ___
Mr. ___

School: _____

Adress: _____

_____

Phone # (days): (___) _____

Signature: _____

Current assignment (grade level, subject(s) taught): _____

_____

Briefly give your reasons for attending this workshop program: _____

_____

_____

146

PEANUTS

I SIGNED UP FOR A NEW COURSE TODAY
IT'S CALLED "INTRODUCTION TO MATH"
IS IT HARD?
NOT AT ALL..
I JUST WALKED RIGHT IN AND SAID, "HOW DO YOU DO, MATH!"

USES OF

MANIPULATIVES

IN THE

CLASSROOM...

JANUARY 21, 1988

... a tuition-free mathematics workshop for GRADE 4 TEACHERS in Nonpublic Schools in New York City

14,

CASE, the Center for Advanced study in Education of The City University of New York's Graduate School and University Center, with special funding from the New York State Education Department under Title II/EESA, is sponsoring a workshop for:

TEACHERS AND MATH SPECIALISTS
with a special focus on
GRADE 5 (also relevant to grades 4 & 6)

on:

TUESDAY, JANUARY 26, 1988

from:

1:00-4:15 p.m.
Desserts and beverages will be served

in:

Room 207

at:

THE CITY UNIVERSITY GRADUATE CENTER,
33 West 42 Street (between Fifth and Sixth Avenues, opposite the New York Public Library).
New York, NY 10036

for more information contact:

Barbara R. Heller, Project Director
(212) 575-1493
Room 300N

WORKSHOP PROGRAM
Tuesday, January 26, 1988

1:00-1:30 REGISTRATION
REFRESHMENTS

1:30-1:40 WELCOME

1:40-2:00 INTRODUCTION, "Manipulatives and the Teaching of Mathematics--Motivating Learning"

2:00-3:45 EXPLORATIONS WITH MANIPULATIVES, including

* Cuisenaire Rods
* Geoboards
* Tangrams
* Attribute Blocks
* Calculators (bring one!)

SPECIAL APPLICATIONS

Logic

Measurement

Patterns and functions

Geometry

Problem-solving

3:45-4:15 GENERAL DISCUSSION

Questions and Answers

DR. SANDRA P. CLARKSON, the workshop leader, is the Director of the Mathematics Learning Center at Hunter College, CUNY, and a Professor in the Department of Mathematical Sciences. She has been teaching since 1967, including three years of classroom experience with junior high school students. Dr. Clarkson is the author of several books, and has given talks and workshops for teachers across the country.

PARTICIPANTS, GRADE 5 (and 4 & 6) TEACHERS, will:

* practice specific skills under expert guidance
* have an opportunity to try out activities that are appropriate in the classroom
* learn hands-on techniques of proven motivation and interest to students
* develop teaching strategies that have special applications to the new mathematics curriculum
* receive resource kits and packets of materials that they can take back to their schools
* network with colleagues from other schools and obtain up-to-date information from authoritative sources

RESERVATION FORM (return by 1/8/88)

I will ___ will not ___ attend the January 26, 1988 Workshop for Grade 5 Teachers. I will ___ will not ___ also attend the workshops for:

Grade 4 ___ Grade 6 ___ teachers. I also understand that I am expected to attend at least one half-day study session in the Spring.

Name: Miss ___ Mrs. ___ Ms. ___ Mr. ___ _____

School: _____

Address: _____

_____

Phone # (days): (___) _____

Signature: _____

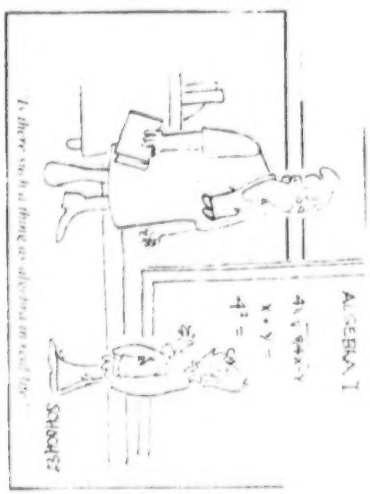
Current assignment (grade level, subject(s) taught): _____

_____

Briefly give your reasons for attending this workshop program: _____

_____

_____



MANIPULATIVES
AND THE
TEACHING OF
MATHEMATICS...

JANUARY 26, 1988

... a tuition-free mathematics workshop for GRADE 5 TEACHERS in Nonpublic Schools in New York City

CASE, the Center for Advanced study in Education of The City University of New York's Graduate School and University Center, with special funding from the New York State Education Department under Title II/EESA, is sponsoring a workshop for:

TEACHERS AND MATH SPECIALISTS
with a special focus on
GRADE 6 (also relevant to grades 4 & 5)

on:

TUESDAY, JANUARY 19, 1988

from:

1:00-4:15 p.m.
Desserts and beverages will be served

in:

Room 207

at:

THE CITY UNIVERSITY GRADUATE CENTER,
33 West 42 Street (between Fifth and Sixth Avenues, opposite the New York Public Library).
New York, NY 10036

for more information contact:

Barbara R. Heller, Project Director
(212) 575-1493
Room 300N

WORKSHOP PROGRAM
Tuesday, January 19, 1988

1:00-1:30 REGISTRATION
REFRESHMENTS

1:30-1:40 WELCOME

1:40-2:00 INTRODUCTION, "Using Manipulatives: Theory, Practice, and Reinforcement in the Classroom"

2:00-3:45 EXPLORATIONS WITH MANIPULATIVES, including

* Cuisenaire Rods
* Geoboards
* Polyminoes
* Attribute Blocks
* Tangrams
* Calculators (bring one!)

SPECIAL APPLICATIONS

Mental Arithmetic

Logic

Geometry

Statistics & Probability

Problem-solving

3:45-4:15 GENERAL DISCUSSION

Questions and Answers

DR. SANDRA P. CLARKSON, the workshop leader, is the Director of the Mathematics Learning Center at Hunter College, CUNY, and a Professor in the Department of Mathematical Sciences. She has been teaching since 1967, including three years of classroom experience with junior high school students. Dr. Clarkson is the author of several books, and has given talks and workshops for teachers across the country.

PARTICIPANTS, GRADE 6 (and 4 & 5) TEACHERS, will:

* practice specific skills under expert guidance
* have an opportunity to try out activities that are appropriate in the classroom
* learn hands-on techniques of proven motivation and interest to students
* develop teaching strategies that have special applications to the new mathematics curriculum
* receive resource kits and packets of materials that they can take back to their schools
* network with colleagues from other schools and obtain up-to-date information from authoritative sources

RESERVATION FORM (return by 1/8/88

I will ___ will not ___ attend the January 19, 1988 Workshop for Grade 6 Teachers. I will ___ will not ___ also attend the workshops for:

Grade 4 ___ Grade 5 ___ teachers. I also understand that I am expected to attend at least one half-day study session in the Spring.

Name: Miss ___ Mrs. ___ Ms. ___ Mr. ___ _____

School: _____

Address: _____

_____

Phone # (days): (___) _____

Signature: _____

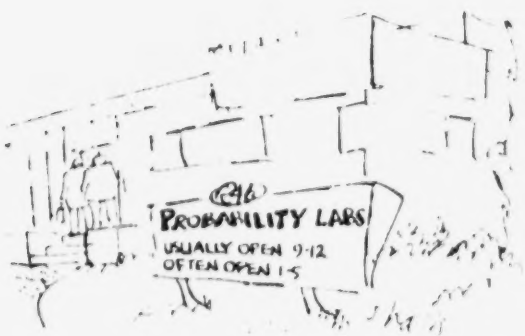
Current assignment (grade level, subject(s) taught): _____

_____

Briefly give your reasons for attending this workshop program: _____

_____

_____



MATHEMATICS APPLICATIONS:

Theory, Practice, and Reinforcement in the Classroom...

JANUARY 19, 1988

... a tuition-free mathematics workshop for GRADE 6 TEACHERS in Nonpublic Schools in New York City

Project for Sixth Grade Teachers (CASE)

Select a manipulative device.

Make up **three** activities for your students to do using these manipulatives. Try them out in class. Write your observations and hints for other teachers who use the activity. What would you do differently next time? What are some of the problems you observed? What are some of the questions asked by your students? etc.

Present each activity on a single page and use one additional page to discuss your observations. This means each of you will bring in a four page project to the study group meeting. We will present these and discuss them and make copies so that each teacher will have copies of activities from the other teachers in your study group On the bottom of the discussion page be sure to write your name and include a telephone number (if you wish) so your fellow teachers can contact you and tell you how successful your activities were in their classrooms.

Note: If you are unable to design three activities, you may find activities designed by someone else. You may use these to fulfill your project commitments if you cite the author and reference on the activity page.

If you have any questions or problems, please call me at 772-5376. Be sure to say that you are a teacher working with me on a project. That way, I will get the message quicker.

Sandra Clarkson

SAMPLE

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

January 26, 1988

To: Participants at the Thursday, January 21 Workshop for
Grade 4 (and other) Teachers from the Nonpublic Schools

From: Barbara R. Heller, Project Director Barbara Heller

Subject: Suggested Activities in Preparation for the Spring Study Sessions

At our Workshop on January 21, 1988, Dr. Susan Turkel suggested that, as preparation for the followup study sessions to be scheduled for late April-May, each participant try out three (3) activities involving the use of manipulatives with her/his class. This is just to remind you that you may use the manipulatives that were discussed at the Workshop or any others that you want to work with. You may also select one or more of the activities that were presented or find or design some of your own. The only requirement is that the activities for the children should, of course, be related to the mathematics curriculum.

Susan and I would like you to write up a brief paragraph or two about each activity--the problems you may have encountered as well as the positive outcomes and suggestions for other teachers. These will be the basis for the study sessions, after which we would like to be able to share everyone's activities, with the brief descriptions, with all the other participating teachers from all the schools. In this way, each person will have a large set of materials they can use in class.

If you have any questions now, or as you are exploring the manipulatives, please call me at (212) 575-1493. If I can't help you, Susan Turkel will call you back. We will be sending you the Spring Study Session schedule shortly and look forward to your continued interest in this project.

cc: Dr. Susan Turkel

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

February 16, 1988

To: Participating Teachers, Nonpublic School Mathematics Project
From: Barbara R. Heller, Project Director BRH/gm

SAVE A DATE

Now that our January mathematics Workshops, in which many of you participated, have been successfully completed, it's time to begin planning for the Spring small study groups. These small group meetings will be held in different locations throughout the city and will continue our exploration of the use of manipulatives in math introduced in the Workshops.

All teachers, including those who were not able to attend a Workshop, are encouraged to come to one of the Spring study groups, and we will have packets of manipulative materials for those teachers who did not receive them in January. So, save a date! Although you might want to go to a study group led by the same person and dealing with the same grade as you attended previously, everyone is welcome to any and all of the study sessions. If you haven't come to one of the Workshops, it's still worthwhile to come to one or more study groups.

Registration forms and detailed travel directions will be sent to you in March, but in the meantime, please make note of the following dates and places (all study group sessions will take place from 1-4 p.m.):

Grade 4--Dr. Susan Turkel: Monday, April 18, CUNY Graduate Center (mid-Manhattan); Monday, April 25, Queens College (Queens); Monday, May 2, New York City Technical College (downtown Brooklyn).

Grade 5--Dr. Sandra Clarkson: Tuesday, April 19, CUNY Graduate Center; Tuesday, April 26, LaGuardia Community College (Long Island City, Queens); Tuesday, May 3, New York City Technical College.

Grade 6--Dr. Sandra Clarkson: Thursday, April 21, CUNY Graduate Center; Thursday, April 28, Queens College; Thursday, May 5, New York City Technical College.

You can call me at (212) 575-1493 if you have any questions about the upcoming meetings or about the manipulative materials we worked with in January.

cc: Dr. Sandra Clarkson
Dr. Susan Turkel
NPS Mathematics Advisory Group
Dr. Anne Marie Haase
Dr. Mitchel K. Lee

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

March 10, 1988

MEMORANDUM

To: Teachers who took part in the January Workshop Program,
Manipulatives in Mathematics

From: Barbara R. Heller

At the January Workshops at which we introduced or reintroduced the concept of manipulatives in the teaching of mathematics in grades 4, 5, and 6, we asked that you try out some activities based on these types of materials with the children in your class.

Wanting to build on the excitement we hoped to generate, we asked that you develop or try out three exercises--using one or more types of manipulative material--and briefly write up what you did, how the students responded, and how you reacted to the lesson, noting particularly any recommendations or suggestions you would make to teachers like yourself. I am enclosing a "Manipulative Activity Form" that you might want to use for this purpose. However, your participation in this is voluntary and if you don't complete the little assignment for any reason it should not stand in the way of your coming to a study group session.

What we intend to do later in the Spring, in the small study groups, is to discuss the experiences you had, come up with some general principals, and develop a set of guidelines and specific activities that could be shared with all the teachers.

If you haven't yet tried using the manipulatives with your classes, I urge you again to consider doing so. Sandy Clarkson, Susan Turkel, and I are available--only a phone call away--should you want some feedback, a hint or two, or some gentle encouragement. My phone number is 212/575-1493 and if I'm not in, I'll call back by the next day. Look for the Spring study session schedule and travel directions that will be mailed to you shortly, and, until then, best wishes for a good holiday.

cc: Advisory Committee
Sandy Clarkson
Susan Turkel
Mildred K. Lee
Principals of participating schools

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

March 10, 1988

MEMORANDUM

To: Teachers in grades 4, 5, and 6, nonpublic schools
From: Barbara R. Heller Barbara R. Heller
Re: Spring study group sessions

As you may recall, the plan for this project called for small group sessions in the Spring in three different locations to follow up on some of the things we covered in the Grade 4, 5, and 6 Workshops held in January of this year.

Even though you were not able to attend a January Workshop, we feel that you will benefit by coming to one (or more) of the study group sessions scheduled for late April-early May. Within the next week or two, you will be sent a detailed schedule, including travel directions and a reservation form. I urge you to plan to attend.

The Workshops focused on the use of manipulatives in the teaching of mathematics and each participant received a packet containing a geoboard and rubber bands, a set of Cuisenaire rods, tangrams, and pattern blocks; we will provide you with you packet in one of the Spring sessions. We also asked participants at the Workshops to try three activities based on manipulatives with the children in their classes and to briefly report on the exercise and outcomes in the study group session. In a separate memo to them, we have enclosed a copy of the attached "Manipulative Activity Form" for them to use for this purpose.

Although it is entirely up to you, you might want to try to develop two or three exercises for your students that involve the use of these or other manipulatives and also briefly write about what you did, how the students responded, and what suggestions and ideas you have for other teachers. What we intend to do in the small study groups is to discuss everyone's experiences, come up with some general principles, and develop a set of guidelines and specific activities pertaining to manipulatives that can be shared with all teachers. If you want some ideas, a hint or two, or some more gentle encouragement, call me at 212/575-1493 and I'll put you in touch with our experts in math education.

Look for the study group schedule and start making plans to meet with us at one of the Spring sessions in a location accessible to your school.

cc: Advisory Committee
Sandy Clarkson
Susan Turkel
Mildred K. Lee
Principals of participating schools

Center for Advanced Study in Education
Graduate School and University Center
The City University of New York

MANIPULATIVE ACTIVITY FORM
Nonpublic School Mathematics Project

Type of Manipulative (State name, describe activity, specify if commercially produced or made by teacher/students.)

The Activity (Describe the assignment for students, highlighting the points enumerated below.)

1. Objective (State the major purpose of the exercise--e.g., "to introduce the concept of area.")

2. Grade level of students/Type of grouping (E.g., fifth graders in groups of three--one set of manipulatives for every group.)

3. Students' responses (Note the level of interest, the observable impact on learning, and pertinent comments and reactions of students.)

4. Special Problems (include here any special problems, such as noise level, difficulty in handling small pieces, etc.)

Conclusions and Recommendations (State the outcomes of the activity, your conclusions about its worthwhileness, and your suggestions and recommendations for other teachers.)

Optional
Name: _____

School: _____

Use the reverse side of this page if you need more space.

The Graduate School and University Center
of the City University of New York

Center for Advanced Study in Education
Graduate Center: 33 West 42 Street, New York, N.Y. 10036
(212) 575-1493

March 18, 1988

To: Participating Teachers, Nonpublic School Mathematics Project

From: Barbara R. Heller, Project Director

Subject: Spring Study Groups

Enclosed is a description and a registration form for our Spring study groups which will take place from April 18 to May 5. The Grade 4 meetings will be on Mondays, Grade 5 on Tuesdays, and Grade 6 on Thursdays; you don't have to go to the study group for your own grade.

The study groups for each grade will be held in three locations, one each in Manhattan, Queens, and Brooklyn. (Travel directions are on the next page.) Those of you who attended one of our January Workshops might want to go to a study group session covering the same grade and led by the same person as before. You are welcome, however, to go to any meeting, and we encourage you to attend as many as you can. Come even if you did not attend in January and haven't done much work with manipulatives. If you've done some things, you might write them up, using the form we sent you or just a paragraph or two on a plain piece of paper. For those of you who did not attend a Workshop, we have your packets of materials.

The dates and places of the study group sessions are listed below. All will take place from 1:00-4:00 p.m. As in January, kosher refreshments (coffee, tea, cookies, fruit) will be served.

Grade 4--Dr. Susan Turkel (3 Mondays)
April 18--CUNY Graduate Center (mid-Manhattan), Rm. 620
April 25--Queens College, 100A Powdermaker Hall
May 2--New York City Technical College (downtown Brooklyn), Rm. M509, 250 Jay St.

Grade 5--Dr. Sandra Clarkson (3 Tuesdays)
April 19--CUNY Graduate Center, Rm. 620
April 26--LaGuardia Community College (Queens), Rm. 201, 31-10 Thomson Ave., Long Island City
May 3--New York City Technical College, Rm. M509, 250 Jay St.

(continued on reverse side)

Grade 6--Dr. Sandra Clarkson (3 Thursdays)
April 21--CUNY Graduate Center, Rm. 620
April 28--Queens College, 100A Powdermaker Hall
May 5--New York City Technical College, Rm. M509, 250 Jay St.

Directions to the various locations are:

CUNY Graduate Center: Rm. 620, 33 West 42nd St., Manhattan, between Fifth and Sixth Avenues. By subway: take the Sixth Avenue line to 42nd St. or the #7 IRT to Fifth Avenue; the Times Square station and Grand Central station are also an easy walk. If you are driving, there are several garages (expensive!) in the area.

Queens College, 100A Powdermaker Hall, 65-30 Kissena Blvd., Flushing. By public transportation: take the IRT #7 or Long Island Railroad to Main St., then the Q25 or Q25-34 bus to the campus; or take the IND subway to Forest Hills, then the Q65A bus to Kissena Blvd. and Jewel Ave., one block from the campus. For those driving, the college is at the corner of the Long Island Expressway and Kissena Blvd.

New York City Technical College, Rm. M509, 250 Jay St. (near Tillary St.), Brooklyn. By subway: take the A, F, or CC to Jay St.; the RR, M, or N to Lawrence St. or Court St.; or the IRT to Borough Hall. Walk two short blocks. By car, the Cadman Plaza exit on the Brooklyn-Queens Expressway (BQE) is the closest.

LaGuardia Community College, Rm. 201 (Dean's Conference Room), 31-10 Thomson Ave, Long Island City. Take the #7 subway to the 33 St.-Rawson Ave. station; the Queens Plaza IND station is also nearby (E, F, GG, & N trains). By car, take the Van Dam St. exit on the Long Island Expressway, go right at the light, then left at the next light (Thomson Ave.).

Please use the enclosed Reservation Form to indicate which study group sessions you plan to attend. Please return it to us at the address indicated on the form. If you have any questions, or require further directions to the study session locations, please call me or Jeff Miller at 212/575-1493.

cc: Dr. Sandra Clarkson
Dr. Susan Turkel
Dr. Mildred K. Lee
Principals of Participating Schools
NPS Mathematics Advisory Group

RESERVATION FORM
(Return by April 6, 1988)

I will attend the following Spring Study Group Sessions (Be sure to make a note of those you have chosen.):

Grade 4:		
Mon., April 18____	Mon., April 25____	Mon., May 2____
CUNY Grad. Center	Queens College	NYC Tech. College
Grade 5:		
Tues., April 19____	Tues., April 26____	Tues., May 3____
CUNY Grad. Center	LaGuardia Comm. Coll.	NYC Tech. College
Grade 6:		
Thurs., April 21____	Thurs., April 28____	Thurs., May 5____
CUNY Grad. Center	Queens College	NYC Tech. College

Name: Miss___ Mrs.___ Ms. ___ Mr. ___ _____

School: _____

Address: _____

Phone No. (days): (___)_____

Current assignment (grade level, subjects taught):

_____

Briefly give your reasons for attending this workshop program:

_____

Signature: _____

Return this form by April 6 to:

Prof. B.R. Heller
Center for Advanced Study in Education
City University Graduate Center
25 West 43rd St., Rm. 300N
New York, NY 10036

Call me or Jeff Miller at 212/575-1493 if you have any questions.

APPENDIX E

MISCELLANEOUS MATERIAL

Consultant's Evaluation E1

Sample Newsletter Article Written by A Teacher Participant. E2

May 7, 1988

To: Barbara Heller
Project Director
Fr: Sandra Clarkson
Workshop Presenter
Re: Evaluation and Impressions

As usual, working with the teachers from the non-public schools is a refreshing experience. I found the teachers interested and receptive to ideas. They appeared to want to learn and asked thoughtful questions. The workshops went well for both the fifth and the sixth grade teachers. The assignments given were reasonable and could have served as an additional learning vehicle had the teachers all participated as enthusiastically in the follow up workshops as they did in the original ones.

Although my telephone number was given to all the fifth and sixth grade teachers, only one called me and that was to check to see what materials were being sent.

In the follow-up study groups, the teachers attending had, indeed, tried using manipulatives and could discuss their experiences. The sessions did result in a good deal of one-on-one questioning and I tried, in 3 hours' time to teach these teachers what I knew about using manipulatives to teach decimals, fractions and particularly those topics in relation to multiplication and division. We discussed and explored many activities using estimation and I discovered that teachers are quite weak in their understanding of the topics mentioned previously. There seems to be an out-of-proportion concern about long division given the current "de-emphasis' of the topic in the latest texts. Teachers had difficulty separating the problems of teaching a student how to do something and getting him to do it. Their students often understood how to do it but wouldn't "complete their work." Motivational aspects of manipulatives were discussed and teachers seemed willing to use them.

Clearly, there is little money for materials in these schools and teachers made a lot of their own materials for students. They seem somewhat hesitant to try out their own ideas, preferring to use materials prepared commercially.

I suggest that the next time a project like this is contemplated that some "carrots" be left for the teachers until the end of the project. I think many teachers were perfectly willing to come learn about some things and get materials but did not want to do any work or discuss their own ideas. They appear to be consumer oriented instead of product oriented. That is, they will take what we give but do not expect them to do anything for it. Unfortunately, this results in them "getting" much less than they could have.

Thank you. I really enjoyed working with this project and I would love to work with you again on a project with this population of teachers.

164

Sandra P. Clarkson

"MATH" ERINGS

ELEMENTARY MATHEMATICS COUNCIL
March 1988

WHAT'S NEW?

The March 1988 issue of the Instructor has an interesting article for teachers of Math. Written by Laurel G.Sherman, Get on the Right Math Track suggests that the reason US math students score lower than students in foreign countries is due to the fact that the curriculum spirals back each year with little room for advancement to more interesting and stimulating topics. Textbooks have been written to adapt to this condition leaving the most important function of mathematics to end chapters (which are never read), to supplementary texts or library resources.

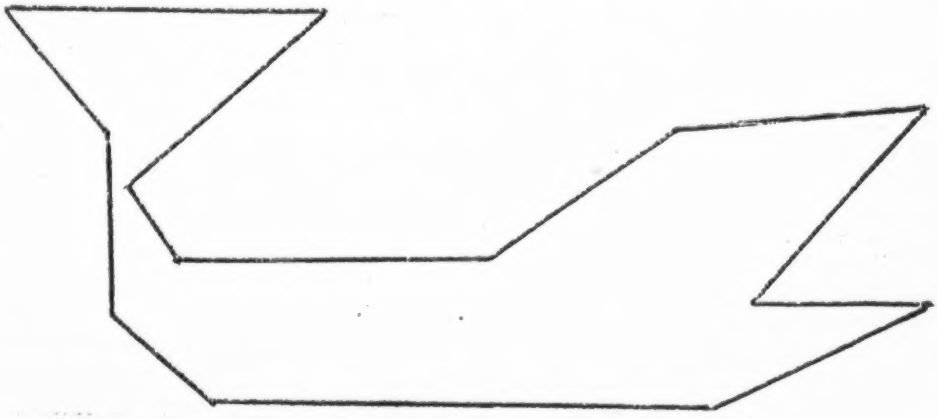
Sherman in recognizing this problem offers a very worthwhile solution.Is it beyond the reach of any one teacher? Read the article! Give the suggestion a try!

HOW TANGRAMS CAN BE USED IN THE CLASSROOM

Do you know that Math can be fun for the students? Observe the way the students would re-assemble a set of tangrams to make a square! The objective is not merely to provide fun for them, but is really a method of stimulating them the think logically using visual memory together with the eye-hand coordination.

By experimenting with the pieces, pupils can form triangles, parallelograms or various other shapes. These can also be used to show concrete relationships such as comparison of sizes and shapes of various figures. For example, students can discover that two small triangles are equal to half of the large triangle or two triangles can make a square.

Can you form this shape using all seven tangram pieces?



Article submitted by
Yvonne Roberts
St.John the Baptist
School.

FOR
NEW YORK STATE
ELEMENTARY SCHOOLS

MATHEMATICS TESTS

The PEP tests are based directly on the math program recommended for NYS schools, as described in the publication Mathematics K-6: A recommended Program for Elementary Schools (1980). The grade 3 test, Form S, is based on the K-3 portion, and the grade 6 test, Form F, is based on the 4-6 portion of this program. Your text is a resource for these topics.

Catholic Educational Leadership Development Center

Invites you

March 24, 1988 at

3:30PM in Marillac Hall

to a workshop

Problem Solving

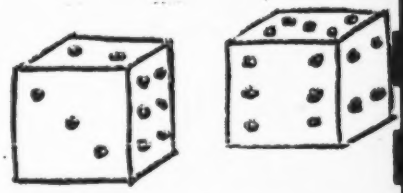
in Math K-8

CELD

During this presentation, several basic problem-solving skills will be illustrated.

Marillac Hall is part of St. John's University.

PROBABILITY

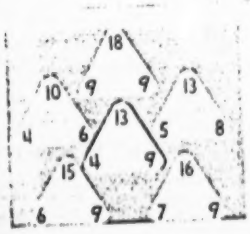


The theory of probability had its beginnings with the needs of gamblers. Today it is a powerful tool in many areas as social sciences, science, industry and insurance. Students can become acquainted with this branch of math through the use of simple experiments. They can examine all possible outcomes, perform repeated trials, tabulate and graph their results. Tossing a coin, rolling a die, spinning a dial are simple experimental devices to teach probability.

What can be accomplished by coin tossing? What can you learn from rolling a die? We want to gather, tabulate, graph and interpret data from experiments and introduce probability. The procedure: the outcome of tossing a coin is either head or tail. Have students toss a coin and record whether it falls heads or tails. The students should tabulate the results. After several trials, the student should predict what would happen if the coin was tossed many times. Test these results against the predictions. This can be extended to tossing two, three, etc. coins.

WHAT GOES WHERE ???

1. The sum is three	a. $x + 3$
2. The subscript is three	b. $x_3 = 3$
3. The root is three	c. x^3
4. The difference is three	d. $3x$
5. The term is three	e. $x/3$
6. The product is three	f. x_3
7. The exponent is three	g. $x/y = 3$
8. The coefficient is three	h. $xy = 3$
9. The quotient is three	i. $x + y = 3$
10. The denominator is three	j. $x - y = 3$



SEND ALL SUGGESTIONS TO SISTER MARY JANE, St. John the Baptist School

Cover one, have students discover it from the other two.

Easy to make